ROSS, MARION. Form as Process in Selected Works of Edgard Varese. (1972) Directed by: Dr. Arthur Hunkins. Pp. 136.

The purpose of this study is to investigate structural procedure in selected works of Edgard Varese. As a point of departure, the study takes two statements of Varese concerning structure. First, Varese says that form, in his music, is the result of a process. Secondly, he draws an analogy between the formation of his works and the formation of crystal--i.e., that like crystal, his works evolve from a single idea, which is the basis of the internal structure. He also feels that, like crystal formations, possible musical forms are limitless. With these ideas in mind, the study analyzes three works: Integrals, Octandre, and Ionization.

The result of analysis indicates that each work does have at its core a brief and compact musical idea which this paper calls the nucleus. The nucleus is then both fragmented and expanded, a process that results in all manner of geometrical shapes or designs.* These different manifestations of the nucleus are arranged in a series of episodic variations, which compose the body of the work.

At the close of each work, change or alteration of the nucleus is of such an extensive and fundamental nature

*Such designs are apparent in pyramidal sound structures, in juxtaposed blocks of sound, or in simultaneously occurring planes of sound.

that the traditional terms of variation and transformation are no longer appropriate. On the other hand, the nucleus (or an element of the nucleus) is still discernible. This paper therefore analyzes the final section of each work as a transmutation of the original material--a radical change in which many dimensions (timbre, structure, pitch content, dynamics, etc.) of the nucleus are enriched to an extent that this final version emerges as an entirely new and different musical substance.

FORM AS PROCESS IN SELECTED WORKS OF EDGARD VARÈSE

by

Marion Ross

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CHAPTER I

INTRODUCTION

Differing Points of View

Discussions of Edgard Varèse's music often generate widely varying points of view. Different writers have heard his work with different ears, different backgrounds and different minds; their writings, taken as a whole, reflect pictures of Varèse that are often as opposite as night and day, and as diverse as the population of Varèse's home city, New York.

Varèse's music has been called static;[1] it has been called music in constant motion.[2] It has been compared to Cubism;[3] it has been compared to Impressionism.[4] Some have said it is almost totally without melody,[5] and others find in it examples of pure melody.[6] Some hear fugues in

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[1]Eric Salzman, Twentieth Century Music: an Introduction (New Jersey: Prentice Hall, Inc., 1967), p. 149.

[2]Paul Rosenfeld, Musical Impressions: Selections from Paul Rosenfeld's Criticisms, edited by Herbert A. Leibowitz (New York: Hill and Wang, 1969), p. 273.

[3]Paul Rosenfeld, An Hour with American Music (Philadelphia: J. B. Lippincott Co., Inc., 1929), p. 173.

[4]Wilfrid Mellers, Music in a New Found Land (New York: Alfred A. Knopf, 1965), pp. 156-157.

[5]Salzman, Twentieth Century Music, p. 149.

[6]Mellers, Music in a New Found Land, p. 160.

it,[7] others hear the discovery of a new counterpoint,[8] and still others hear no counterpoint at all.[9] Where one writer sees his music as a "retreat from the West" into Oriental practices,[10] another calls Varèse "the poet of the tall New Yorks."[11] It has been called spatial rather than temporal music,[12] and it has been called spatial as well as temporal.[13] It has been considered as an extension of the serial technique,[14] while Varèse himself refers to the serialization of pitch present in the twelve-tone method as "hardening of the arteries."[15]

A part of the truth probably exists in each different viewpoint. The purpose of this introduction is to set down the diverse arguments, so that later they can be used as a background when referring to the music itself.

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[7] Ibid., p. 164.

[8] Chou Wen-Chung, "Varèse: a Sketch of the Man and his Music," The Musical Quarterly, LII (April, 1966), pp. 151-170, passim.

[9] Salzman, Twentieth Century Music, p. 149.

[10] Mellers, Music in a New Found Land, pp. 159-160.

[11] Rosenfeld, An Hour with American Music, p. 167.

[12] Salzman, Twentieth Century Music, p. 149.

[13] Rosenfeld, An Hour with American Music, pp. 173-174.

[14] Pierre Boulez, Notes of an Apprenticeship, trans. by Herbert Weinstock (New York: Alfred A. Knopf, 1968), pp. 230-232.

[15] Wilfrid Mellers, "The New Music in a New World," Twentieth Century Music, ed. by Rollo H. Myers (New York: Orion Press, 1968), p. 243.

The following writers have expressed opinions on Varèse's music:[16] Paul Rosenfeld, Wilfrid Mellers, Eric Salzman, Donald Mitchell (about Cubism in music), Pierre Boulez, William Austin, H. Wiley Hitchcock, Chou Wen-Chung, Milton Babbitt, H. H. Stuckenschmidt, Robert Craft, Henry Cowell, Gunther Schuller, and Andre Hodeir. The discussion which follows will expound their views, as well as those of Varèse, on a number of specific topics.

The Question of Motion

Rosenfeld believes that Varèse's music moves, and moves fast.[17] To his ear, it is "responsive to the fast-moving, high-pitched, nervous, excited reality surrounding us,"[18] and he describes it as "shining cubes . . . set in abrupt pulsing motion."[19] He compares it to the machines around us "suddenly set moving, swinging, throbbing,"[20] or more abstractly to "grandly resisting and moving volumes."[21] Further, Rosenfeld shows how the music moves, using Integrals as an example. He says it moves by a polyphony not of lines, but of "metallic cubical volumes" which move in solid masses of sound.[22] Sudden stops and an absence of connectives contribute to the

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[16] For the listing of these writers' works on Varèse, see the Bibliography.

[17] Rosenfeld, Musical Impressions, p. 273.

[18] Ibid. [19] Ibid., p.80. [20] Ibid., p. 276.

[21] Ibid. [22] Ibid., p. 275.

squareness of the motion.[23] But Rosenfeld does not indicate the specific points at which it moves, or toward what it moves.

Mellers hears in Varèse's music both a static element and an element of motion, but he emphasizes the static, saying that the motion which occurs is periodic motion which takes place only over a long span of time.[24] For instance, he cites Ionization as an example of this broad motion, where the piece, as a whole, moves from the realm of non-pitched percussion instruments at the beginning to the realm of pitched instruments at the end.[25] Mellers relates the static aspect of music to the spatial,[26] and he sees in the music of Debussy, Varèse, and Cage a progressive development of this joint concept.[27] He points out that Debussy's chords, Varèse's timbres, and Cage's single notes exist in space rather than move through time, since in this music "the chord may exist in its own right, as a moment of sensation, with no before or after."[28] Lacking the element of progression, the music becomes non-temporal and static--at least on the smaller level of chord to chord succession.

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[23] Ibid., p. 80.

[24] Mellers, Music in a New Found Land, p. 159.

[25] Ibid. [26] Ibid., p. 146. [27] Ibid., p. 177.

[28] Ibid., p. 146.

Mellers also hears Varèse's technique of cumulative repetition (in Ionization) as essentially static.[29] His implication is that a phrase which is repeated a number of times really has not moved anywhere.[30] Finally, he points out that Varèse's crystal-like formations are based on the idea of mutation, not development.[31] While in Arcana the crystal permutations create an "arch of tension," the crystal itself does not develop, but remains the same from beginning to end.[32]

Hitchcock also feels that motion occurs in Varèse's music over a long period of time, although he says that Varèse creates this sense of motion in the same way as the post-Romantics--that is, a motion toward "massive single climaxes"[33] which occur "near the conclusions"[34] of the

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[29] Ibid., p. 159.

[30] Ibid.

[31] Ibid., p. 164. In speaking of crystal-like formations, Mellers is referring to Varèse's analogy between his compositional process and the formation of crystal. The analogy is quoted in its entirety on pages 26-27 of this paper.

[32] Ibid., pp. 164-165. Mellers uses the term crystal to refer to Varèse's basic internal idea, the nucleus from which the entire piece evolves. Crystal permutation refers to changes which occur within the basic internal idea, particularly those which affect a change in the order of the initial pitch presentation.

[33] H. Wiley Hitchcock, Music in the United States: A Historical Introduction (Englewood Cliffs, N. J.: Prentice Hall, Inc., 1969), p. 185.

[34] Ibid.

works. Hitchcock points out these massive climaxes in Hyperprism (measures 72-75), in Ionization (measure 65), and in Integrals (measure 154).[35]

Salzman, perhaps, takes the most radical view on the question of motion, for he says "there is no sense of motion in the conventional sense at all but rather a play of kinetic energies . . . ."[36] He hears Varèse's materials consisting of "fixed, invented musical shapes, powerful static blocks of sound piled up in great spatial juxtapositions and defining a new, imagined musical space."[37] These materials become "almost totally non-linear,"[38] according to Salzman.

The Question of Cubism

Rosenfeld compares Varèse to Picasso and his paintings.[39] He sees the analogy of Cubism appropriate to Varèse's music for the following reasons:

1. Sudden stops in the music, which he calls "air pockets,"[40] separate the music into distinct segments.

2. Suppression of connectives adds to the feeling of segmentation, gives an angular, geometric quality,

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[35] Ibid., pp. 185-186.

[36] Salzman, Twentieth Century Music, p. 150.

[37] Ibid., p. 150.

[38] Ibid., p. 149.

[39] Rosenfeld, Musical Impressions, pp. 270-276.

[40] Ibid., p. 277.

and also intensifies the contrasting nature of juxtaposed ideas.[41]

3. Rapid crescendos and decrescendos give the music vivid contrast of intensities.[42]

4. Solid masses (cubes) of sound enrich and thicken the texture more than would single polyphonic lines.[43] Rosenfeld implies that the music conveys the dimension of depth because of the complex mixture of timbres.[44]

5. Sounds of city life--those of whistles, horns and factory machinery--are related to Picasso's subjects, which also are contemporary and realistic.[45]

The above elements contribute to a severity of outline and a block-like impression in the music which Varèse himself acknowledges.[46] As a child, he says, he watched the stone cutters in his native France and "marvelled at the precision with which they worked. They didn't use cement, and every stone had to fit and balance with every other."[47] Their structures were "without frills or unnecessary decoration."[48] This experience made a lasting impression on Varèse. He compares his musical materials

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[41] Ibid., p. 275. [42] Ibid., p. 276. [43] Ibid., p. 275.

[44] Ibid., pp. 275-276. [45] Ibid., p. 270.

[46] Gunther Schuller, "Conversation with Varèse," Perspectives of New Music, III (1965), 34.

[47] Ibid. [48] Ibid.

to the blocks of stone with which the stone cutters worked. With seriousness, as well as humor, Varèse once remarked to Gunther Schuller: "I think I would characterize my early music as granitic."[49]

Donald Mitchell, in his book The Language of Modern Music, includes a chapter on how Cubism has affected music.[50] His ideas are included here as additional evidence for a cubistic interpretation of Varèse.

Mitchell understands Cubism as a language which applies to many arts--architecture, music, and literature, as well as painting.[51] He quotes Sigfried Giedion, who describes Cubism in his book Space, Time, and Architecture, as follows:

> It [Cubism] views objects relatively: that is, from several points of view, no one of which has exclusive authority. And in so dissecting objects it sees them simultaneously from all sides--from above and below, from inside and outside. It goes around and into its objects. Thus to the three dimensions of the Renaissance which have held good as constituent facts throughout so many centuries, there is added a fourth one--time.[52]

Mitchell gives a number of examples of such "simultaneity" in art. For instance, in Picasso's painting, L'Arlesienne, both full-face and profile are seen together;

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[49] Ibid.

[50] Donald Mitchell, The Language of Modern Music (London: Faber and Faber, Ltd., 1963), pp. 63-94.

[51] Ibid., pp. 73-74.

[52] Sigfried Giedion, Space, Time, and Architecture (London: n.p., 1956), p. 432.

in architecture, a building may be viewed as inside and outside at a single glance.[53] Although Mitchell discusses Schoenberg, not Varèse, in relation to "simultaneity," this concept would seem to apply equally well to certain elements of Varèse's music. One might cite Varèse's distinct planes of sonority,[54] his heterophony,[55] or his "simultaneity" of different rhythms,[56] as related to Mitchell's discussion.

A final example of possible "simultaneity" in Varèse's music is the correspondence of the horizontal to the vertical. For example, in Integrals, measures 1-26, the horizontal line is composed of the same intervals which make up the vertical sound masses or chordal sonorities.[57] Both line and sound mass are heard together, and neither one seems to have "exclusive authority,"[58] again to quote Giedion.

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[53]Mitchell, The Language of Modern Music, p. 75.

[54]Edgard Varèse, "New Instruments and New Music," in Contemporary Composers on Contemporary Music, ed. by Elliott Schwartz and Barney Childs (New York: Holt, Rinehart and Winston, 1967), p. 197.

[55]Mellers, Music in a New Found Land, p. 164.

[56]Edgard Varèse, "Rhythm, Form and Content," in Contemporary Composers, p. 202.

[57]Chou Wen-Chung, "Varèse: a Sketch," p. 158.

[58]Giedion, Space, Time, and Architecture, p. 432.

The Question of Impressionism

Whereas Rosenfeld hears "shining Cubes"[59] in Varèse's music and speaks of him as a first cousin to Picasso and Cubism, Mellers detects a different kinship. To him, Varèse is the direct descendant of Debussy and Impressionism; he hears Varèse as extending the ideas Debussy initiated.[60] He emphasizes the importance that both Debussy and Varèse attach to sound itself.[61] But while Debussy worked within a framework of diatonic and chromatic melody, and tonal harmony,[62] Varèse discards these and takes as his starting point a particular sound which itself becomes the basis for the composition.[63] Mellers points out that Varèse expands Debussy's domain of musical sounds. Where Debussy had written chords existing for the "moment of sensation," Varèse includes a new world of various timbres.[64] These timbres often cross that undefined barrier where they become noise. To Varèse, the vibrations and noises he heard in factories, on docks, and in the streets, opened up a new musical field for exploration.[65]

Mellers notes that Varèse uses the characteristic sounds of instruments as intrinsic to the structure of

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[59] Rosenfeld, Musical Impressions, p. 80.

[60] Mellers, Music in a New Found Land, p. 156.

[61] Ibid., p. 157. [62] Ibid. [63] Ibid., pp. 157-158.

[64] Ibid., p. 157. [65] Ibid.

his compositions.[66] Changes of attack, dynamics, texture and register often constitute "what happens" in the course of a composition,[67] in contrast to traditional structures[68] built on thematic contrast and defined tonal areas. Here again, Varèse expanded upon Debussy's groundwork in loosening the traditional forms. Debussy had already departed from this framework by his use of continuous melody (in Pelléas and Mélisande), modality, chord streams and unresolved dissonance.[69] Varèse went further, by acknowledging the characteristic properties of sound itself as elements on which to construct music.[70]

Varèse also shared Debussy's interest in unusual and exotic timbres.[71] He shows this by writing for the platinum flute (Density 21.5), the heckelphone,[72] the siren,[73]

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[66] Ibid., p. 158.

[67] For additional information, see Hitchcock, Music in the United States, p. 183.

[68] Traditional structures in this instance connotes those forms associated with the classical system of the eighteenth and nineteenth centuries.

[69] Peter Hansen, An Introduction to Twentieth Century Music (Boston: Allyn and Bacon, Inc., 1967), pp. 28-34, passim.

[70] Mellers, Music in a New Found Land, p. 158.

[71] For a discussion of Debussy's exploration of timbre, see Hansen, Twentieth Century Music, p. 33.

[72] A baritone oboe, used in Arcana.

[73] Used in Poème Electronique.

the lion roar,[74] bass clarinet[75] and contrabass trombone,[76] as well as a wide range of percussion instruments.[77]

Unusual ways of playing usual instruments also interested him, as is indicated by the frequent use of a wind or brass instrument playing a rhythmic pattern on a single pitch, with attacks, dynamics, and rhythms varied.[78]

In addition to the exploration of sound, a second comparison which Mellers makes between Debussy and Varèse is their use of melismatic melody lines "oscillating around nodal points."[79] These melismas, curling inward on themselves, and not aiming in any particular direction, impart a sense of will-lessness which he considers to be exemplified in Debussy's Pelléas and Mélisande and Syrinx.[80] Varèse's melismatic writing may be found in Density 21.5 and in Integrals. Because they are not directed to any specific place, the melismas add to the static quality which Mellers feels permeates the work of both Debussy and Varèse.[81]

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[74] A string drum, used in Integrals.

[75] Used in Arcana. [76] Used in Integrals.

[77] See scoring for Ionization.

[78] Robert Craft, jacket notes for Music of Edgar Varèse (Columbia MS 6146).

[79] Mellers, Music in a New Found Land, p. 160.

[80] Ibid., p. 145 and p. 160.

[81] Ibid., p. 160.

A third comparison[82] between Debussy and Varèse may possibly be made through what Schuller has called "static continuity."[83] Debussy achieves this through his frequent use of ostinatos.[84] Varèse, on the other hand, uses a variety of techniques which resemble the ostinato, but which do not fit a standard definition of that term.[85] Repeated timbres, textures and sound complexes which one finds in his music seem to constitute a departure from, or expansion of the traditional ostinato. Schuller has defined "static continuity" in Varèse as ". . . the repetition and near-repetition of the same elements in constantly new juxtapositions and successions. . . ."[86] Other writers also have pointed out that Varèse uses successive repetition as an important structural element in his music.

The Question of Melody

Varèse's conception of melody clearly seems related to Debussy's use of melody in Pelléas and Mélisande, where

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[82]The comparison between Debussy and Varèse in this instance is the writer's. Although Schuller describes "static continuity" in Varèse's work, he makes no comparison between it and the ostinato technique of Debussy.

[83]Schuller, "Conversation with Varèse," p. 34.

[84]Mellers, Music in a New Found Land, pp. 145-146.

[85]The Harvard Dictionary of Music (Cambridge, Mass.: Harvard University Press, 1944) gives the following definition for ostinato: "A clearly defined melodic phrase which is repeated persistently, usually in immediate succession, throughout a composition or a section thereof."

[86]Schuller, "Conversation with Varèse," p. 34.

there is no differentiation between aria and recitative, but rather a continuous melodic flow.[87] This conception may be inferred from Varèse's statement on melody in relation to his own compositions.

> When new instruments will allow me to write music as I conceive it . . . there will no longer be the old conception of melody or interplay of melodies. The entire work will be a melodic totality. The entire work will flow as a river flows.[88]

Varèse was speaking specifically of the movement of sound masses and of shifting horizontal planes of sound in his electronic music. Hitchcock, however, feels that the conception also holds true for Varèse's pre-electronic compositions.[89] He believes that "sound masses replace thematic material"[90] and that they are "varied, developed, interlocked or superimposed somewhat in the way themes might be."[91] Hitchcock, it appears, thinks of Varèse's "melody" as primarily a texture resulting from the interconnection of different planes of sound.[92] Such an interpretation of melody thus expands the traditional meaning of the term.

Salzman, in contrast, does not feel that the shifting planes and masses constitute melody, or, for that

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[87]Hansen, An Introduction, p. 20.

[88]Varèse, "New Instruments and New Music," p. 197.

[89]Hitchcock, Music in the United States, pp. 184-185.

[90]Ibid., p. 185. [91]Ibid. [92]Ibid.

matter, horizontal lines.[93] He says that Varèse's "materials become almost totally non-linear"[94] and that his music "gradually detaches itself almost completely from thematic construction of any kind."[95] Apparently Salzman does not hear a polyphony of planes moving horizontally.[96] instead he hears the sound as predominantly vertical, as detached "static blocks of sound."[97]

Regardless of whether Varèse's sound masses may or may not "replace thematic material,"[98] they constitute but one type of linear construction which writers on his work have noted. Other kinds of linear writing have been observed also, particularly those which have a kinship with ancient and Oriental music. These include the melismatic melodies and "incantatory repetitions"[99] which were discussed previously in connection with Debussy and Impressionism.

A different view of Varèse's use, or non-use, of melody is taken by Cowell. He believes that Varèse often subordinates or even obliterates melody to focus attention

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[93] Salzman, Twentieth Century Music, p. 149.

[94] Ibid. [95] Ibid. [96] Ibid., p. 150.

[97] Rosenfeld, also, emphasizes the vertical aspect. See his Musical Impressions, p. 275.

[98] Hitchcock, Music in the United States, p. 185.

[99] For an example of "incantatory repetition," see Mellers' discussion of Density 21.5 in Music in a New Found Land, p. 160.

on subtle rhythms, dynamics and timbres.[100] Cowell cites Varèse's repeated notes or repeated figures as examples of the subordination of melody.[101] In such passages, the dynamics or rhythms are usually highly complex. Almost every note has a different marking, and Cowell finds examples of certain notes which have as many as four or five different dynamic markings throughout their durations.[102] Cowell also observes that Varèse's melody, "when he uses it, is often characterized by wide skips, broken sometimes by chromatic passages. . . ."[103]

Cowell points out Varèse's "discontinuance of melody" in the work Hyperprism.[104] The central figure, in this case, is a rhythmic motif heard first in the bass drum, measure one. The motif is imitated by wind and brass instruments, but retains its primarily rhythmic nature because of Varèse's extensive use of repeated notes. Throughout the piece, attention is focussed upon subtle and complex rhythmic variations. Changes of pitch are kept at a minimum.

Chou Wen-Chung's term, "expanding plane,"[105] may help to clarify the preceding discussion on melody. He

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[100]Henry Cowell, American Composers on American Music (Stanford, Calif.: Stanford University Press, 1933), p. 45.

[101]Ibid. [102]Ibid. [103]Ibid., p. 47.

[104]Ibid., p. 46.

[105]Chou Wen-Chung, "Varèse: A Sketch," p. 158.

uses it to describe the "idea," or horizontal line, which appears in Integrals (measures 1-29).[106] He does not define the "expanding plane" except by giving an example. However, the term is appropriate, because it suggests something new in Varèse's music--neither melody in a traditional sense, nor yet the cessation of a continuous line. Chou Wen-Chung's term seems to reconcile the diverse opinions relating to what others have called (somewhat hesitantly) melody, theme, or the discontinuance of both.

The Question of Counterpoint

Critics likewise disagree about Varèse's use of counterpoint. Some have even questioned whether he employed it at all.

Austin suggests that he did not. He says:

> Varèse cared no more than Debussy for counterpoint. In this respect, especially, he differed from nearly all his contemporaries. On the other hand he did not subordinate chords and colors to melodic lines, as Debussy did. Rather he subordinated both harmonic and melodic intervals to rhythm and sonority.[107]

Hodeir appears to agree when he says: "Ionization and Integrals . . . seem to show that music might exist independently of any harmonic, contrapuntal, or even melodic considerations. . . ."[108]

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[106] Ibid.

[107] William Austin, Music in the Twentieth Century, from Debussy through Stravinsky (New York: W. W. Norton Co., 1966), p. 377.

[108] André Hodier, Since Debussy, a View of Contemporary Music (New York: Grove Press, Inc., 1961), pp. 138-139.

Salzman, as quoted earlier, hears Varèse's materials as "almost totally non-linear"[109] and points to the "fixed . . . shapes"[110] and "static blocks of sound"[111] as evidence for his interpretation.

Varèse, however, expresses a different view. He says that he worked with the "movement of sound masses, of shifting planes."[112] He thought of these planes of sound as "constantly changing in shape, direction and speed, attracted and repulsed by various forces."[113] This interaction of mass and plane, in his words, "takes the place of linear counterpoint."[114] Varèse further elaborates on sound masses:

> . . . When these sound masses collide the phenomena of penetration or repulsion will seem to occur. Certain transmutations taking place on certain planes will seem to be projected onto other planes, moving at different speeds and at different angles. . . . In the moving masses you will be conscious of their transmutations when they pass over different layers, when they penetrate certain opacities, or are dilated in certain rarefactions. . . .[115]

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[109] Salzman, Twentieth Century Music, p. 149.

[110] Ibid. [111] Ibid.

[112] Varèse, "New Instruments," in Contemporary Composers, p. 197.

[113] Varèse, "Rhythm, Form, and Content," p. 203.

[114] Varèse, "New Instruments," p. 197. Rosenfeld affirms Varèse's view of counterpoint, when he says that the polyphony is not so much of lines as it is of cubical volumes. See Rosenfeld, Musical Impressions, p. 77.

[115] Varèse, "The Liberation of Sound," in Contemporary Composers, p. 197.

Varèse's purpose, then, was not to avoid contrapuntal texture in his music, but to use it in a new way. Instead of a texture which had previously placed note against note, he was exploring a new texture of complex sound against complex sound. This technique may explain why some critics describe Varèse's motion as slow or static. It seems reasonable to assume that a mass of sound would not move with the agility of a single line.

Chou Wen-Chung believes that ". . . the growth and interaction of sound masses in space through a continual process of expansion, projection, interaction, penetration, and transmutation . . ."[116] represents a highly significant part of Varèse's work. Chou Wen-Chung finds these masses not only in Varèse's electronic compositions, but also in his earlier works--Integrals, Octandre, Ionization, etc.--and even in his piece for solo flute, Density 21.5.[117] Chou Wen-Chung defines sound mass in this manner:

> . . . a sound mass refers to a body of sounds with specific attributes in interval content, register, contour, timbre, intensity, attack and decay. Sound masses seem to emerge out of the expansion of an idea--'the basis of an internal structure'--into sonic space.[118]

Chou Wen-Chung has analyzed how the sound mass works in Integrals.[119] Because of the detailed and technical

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[116] Chou Wen-Chung, "Open Rather Than Bounded," Perspectives of New Music, Fall-Winter, 1966, p. 3.

[117] Ibid. [118] Ibid.

[119] Chou Wen-Chung, "Varèse: a Sketch," pp. 158-160.

nature of his discussion, this information is included in the analysis of Integrals, pages 35-36. Chou Wen-Chung's study reveals the unique way in which Varèse worked with counterpoint.[120]

The Question of Serialism

The question of serialism raises differing points of view. No writer calls Varèse a serialist composer. Yet, some point to both general and specific influences which serialism had on his music.

Varèse's statements on Schoenberg's application of serialism to pitch materials are unequivocal. He called it "hardening of the arteries."[121] He deplored the limitations of the twelve-tone approach, "especially in the use of the tempered scale and its rigid pitch organization."[122] To his thinking, it was "much more fruitful to use the total sonic resources available."[123]

On the other hand, several writers believe that while Varèse rejected Schoenberg's method,[124] an expanded

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[120]The comparison between sound masses and counterpoint is Varèse's. See supra, p. 18.

[121]Schuller, "Conversations with Varèse," p. 33.

[122]Ibid. [123]Ibid.

[124]Schoenberg's method "consists primarily of the constant and exclusive use of a set of 12 tones. . . . No tone is repeated within the series and . . . it uses all 12 tones of the chromatic scale. . . ." Quoted from Style and Idea, by Arnold Schoenberg (New York: Philosophical Library, 1950), p. 107.

concept of serialism did have an influence on him. Boulez discusses this broader interpretation:

> . . . the greatest importance is not the twelve tones, but much more, the serial conception--that is, the notion of a sound-universe proper to each work, founded on an undifferentiated phenomenon up to the moment when the series is selected, then becoming unique and essential.[125]

Boulez points out that Webern used timbre, dynamics, and groups of tones (sound complexes) as intrinsic parts of the structure. He indicates a similarity between Webern and Varèse, since Varèse also uses the same elements as fundamental to his musical structure.[126]

Varèse himself expressed particular interest in Webern's music and found in it "remarkable possibilities of expansion, new points of departure."[127]

Stuckenschmidt relates Ionization to the serial technique when he says: "Ionization also has a strictly organized rhythmic and dynamic structure of a type that later became common in the serial works of the Darmstadt school."[128]

Babbitt also considers Varèse "in a mainstream"[129] of contemporary development in which he includes Schoenberg

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[125]Boulez, Notes of an Apprenticeship, p. 230.

[126]Ibid., pp. 229-231; also pp. 384-385.

[127]Chou Wen-Chung, "Varese: a Sketch," p. 156.

[128]H. H. Stuckenschmidt, Twentieth Century Music, trans. by Richard Deveson (New York: McGraw Hill Co., 1969), p. 68.

[129]Milton Babbitt,"Varèse: Observations of his Music," Perspectives of New Music, IV (Spring-Summer, 1966), p. 15

Stravinsky, Webern and Berg.[130] He feels that Varèse was not an isolated musician, working outside the primary influences of his day. He points out that Varèse, like his contemporaries, sets forth "a contextual, referential norm for an entire work."[131] This "idea," or "donnée," as he calls it, may be a rhythm, sound complex, or motive. Moreover, Babbitt describes Octandre as constructed on "an all-combinatorial tetrachord."[132] Such an interpretation indicates that Varèse, in Babbitt's estimation, worked with a technique closely associated with the serialists.

While acknowledging particular similarities of Varèse's music to serialism, Babbitt places far more stress on an area where Varèse departs significantly from it--in his use of pitch repetition.[133] He points out that Varèse often opens his works with emphasis on a particular pitch or a particular group of pitches. He feels that Varèse prolongs this sound at the beginning so that every nuance of it may become familiar.[134] The listener will thus be able to understand and recognize the sound when, in the course of the work, Varèse varies it will all manner of timbral, rhythmic, dynamic, registral and pitch changes.

Another use of pitch repetition, Babbitt notes, is found in Octandre. Here, the combinatorial tetrachord

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[130] Ibid. [131] Ibid. [132] Ibid., p. 16.

[133] Ibid., p. 17. [134] Ibid., pp. 17-18.

(G-flat, F, E, D-sharp) is used intermittently throughout the work as an unordered set of pitches.[135] This group of pitches, occurring at specific locations throughout the work, is heard horizontally, vertically, and diagonally.[136] Babbitt's analysis brings out the fact that Octandre has as its "contextual, referential norm" a recurring set of pitches.[137]

The Need for Further Analytical Study

From the preceding background material it is apparent that there are many varying interpretations and contradictory statements regarding Varèse's music. One reason for this confusion may be in the terms which writers have used to describe the compositions. For example, what Mellers calls melismatic melody,[138] Chou Wen-Chung refers to as an "expanding plane."[139] Cowell speaks of the same phenomenon as the "discontinuance of melody."[140] Differences in definition also seem to be present in questions of counterpoint and motion. A second reason for contradictory statements may be one of emphasis. Certain writers appear to stress whatever in Varèse's music is of particular interest to themselves. Thus, Rosenfeld, an art critic (as well as music critic), favors a cubistic

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[135] Ibid., pp. 16-17. [136] Ibid.

[137] See supra, p. 22. [138] See supra, p. 12.

[139] See supra, pp. 16-17. [140] Ibid.

interpretation;[141] Mellers, an authority on French music, finds Impressionistic tendencies;[142] and Babbitt, an expert on serialism, relates Octandre to serial concepts in his analysis.[143]

The most important reason for the conflicting viewpoints, however, undoubtedly rests with a neglected in-depth study of the scores. Of the writers quoted in the introduction, only two have made detailed analyses of Varèse's music: Babbitt, who analyzed pitch relationships in Octandre, and Chou Wen-Chung, who examined sound masses in Integrals and Deserts. (Marc Wilkinson, not previously quoted, has analyzed the harmonic and melodic structure of Density 21.5.)[144] As far as the writer knows, these are the only technical studies which exist.

The three studies mentioned above are concerned with the organization of certain materials which contribute, individually, to the overall structure of the compositions. They are not comprehensive analyses of the large scale organizational plans which underlie the works. Thus, Babbitt treats only specific passages in Octandre, and Chou

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[141] Rosenfeld's By Way of Art (New York: Coward McCann, 1928), includes criticisms of painting, sculpture, literature, and dance in addition to music criticism.

[142] Mellers published a book on French music in 1950: Francois Couperin and the French Classical Tradition.

[143] See Hitchcock, Music in the United States, p. 230, for a discussion of Babbitt's work with serialism.

[144] Marc Wilkinson, "An Introduction to the Music of Edgard Varèse," The Score, XIX (1957), 16-18.

Wen-Chung discusses only isolated measures from Integrals and Deserts. Because structure is an important element in Varèse's compositions, and because there is a lack of research in this area, it appears that a comprehensive view of the structure of certain works would help in further understanding his music. It seems probable that such a study would also help to reconcile the differing viewpoints discussed in the introduction.

CHAPTER II

PROBLEM

In attempting to grapple with the problem of underlying structural organization in Varèse's music, the writer came across, in Varèse's own discussions of his music, his analogy between the formation of his compositions and the phenomenon of crystallization.[1] Varèse quotes Nathaniel Arbiter, minerologist at Columbia University, who describes crystallization in the following manner.

> The crystal is characterized by both a definite external form and a definite internal structure. The internal structure is based on the unit of crystal which is the smallest grouping of the atoms that has the order and composition of the substance. The extension of the unit into space forms the whole crystal. But in spite of the relatively limited variety of internal structures, the external forms of crystals are limitless. . . . Crystal form itself is a resultant rather than a primary attribute. Crystal form is the consequence of the interaction of attractive and repulsive forces and the ordered packing of the atom.[2]

"This," Varèse says, "suggests better than any explanation I could give, the way my works are formed."[3] Varèse continues with this description of his music.

> . . . There is an idea, the basis of an internal structure, expanded and split into different shapes or groups of sound constantly changing in shape,

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[1] Varèse, "Rhythm, Form and Content," p. 203.

[2] Ibid. [3] Ibid.

> direction, and speed, attracted and repulsed by various forces. The form of the work is the consequence of this interaction. Possible musical forms are as limitless as the exterior forms of crystals.[4]

Neither Arbiter's nor Varèse's description specifically defines structural procedure in Varèse's music. However, they do offer insights to Varèse's thinking about structure, and when one compares these descriptions, a clearer picture of what Varèse means begins to emerge.

The distinction Arbiter makes between the "internal structure," based on the "unit of crystal," and the resulting "external form," or shape, is vital to an understanding of Varèse's analogy. Varèse, it appears, relates the "unit of crystal" to his brief and compact musical "idea" when he speaks of it as the "basis of an internal structure."[5] This "idea" is the active ingredient which is capable of being split, or expanded, causing all manner of resulting shapes.[6] The "idea" is thus the dynamic, shaping force from which the complete structure evolves. Varèse seems to liken the resulting musical structure to the form of the whole crystal[7]--what Arbiter described as the extension of the unit into space.

Central to Varèse's conception of structure is his thinking of form as a consequence. He emphasizes this point by further referring to form as "the result of a

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[4] Ibid., p. 202. [5] Ibid.

[6] Ibid. [7] Ibid.

process,"[8] rather than as a pre-existing structure, in the explanation below:

> . . . The misunderstanding [over form versus formlessness] has come from thinking of form as a point of departure, a pattern to be followed, a mold to be filled. Form is a result--the result of a process. Each of my works discovers its own form. I could never have fitted them into any of the historical containers.[9]

One can, therefore, begin an analysis with the knowledge that structure, for Varèse, is the result of a process; and that the "idea"--which seems to be comparable to the "unit of crystal"--acts as the dynamic, shaping force from which the complete structure evolves. Hereafter, this paper will refer to Varèse's "idea" as the nucleus, since this term more precisely conveys that which is the core, the "basis of an internal structure." It will refer to the completed structure as the "external shape," or "external structure."

A preliminary study of the scores indicates that Varèse worked with many different components in constructing his music. Among these are texture, timbre, rhythm, and pitch relationships. The study further suggests the hypothesis that each composition is constructed on a different component (or different combination of components) which is the basis of the structure. It is this particular component that is embodied within the nucleus, and is then

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[8] Ibid., p. 203. [9] Ibid.

expanded to create the external structure. For example, Ionization appears to be built on rhythm; Integrals on texture; and Octandre on pitch relationships. The proposed study will test the validity of such a hypothesis by analyzing these three works.

The study will first analyze the pieces on a broad scale--that is, from the standpoint of large divisions or parts. (Preliminary study indicates that such divisions exist.) This general outline of each piece will provide a framework in which to place the working out of individual textures, timbres, rhythms, or pitch relationships. As noted previously, these elements may constitute the basis for the structure of a given work.

The result of the study should lead to a clearer understanding of what Varèse meant when he compared his process of composition to the formation of crystal. It should emphasize the uniqueness of each work by investigating the contrasting elements on which each is built. Finally, it should clarify the differing views expressed in the introduction by relating them directly to structural procedures in the music.

The three works, and reasons for choosing them, are listed below:

1. Octandre. The nucleus appears to be a particular group of pitches. Pitch, as a primary structural element, will be analyzed.

2. Ionization. In this composition for percussion instruments a pair of simultaneous rhythms seems to be the essential building block, or nucleus. Rhythmic patterns and their variations will be examined for their structural use.

3. Integrals. The progression of different textures seems to define the structural outline of Integrals. Sound masses and expanding planes constitute a significant part of this texture. Integrals was chosen in order to investigate Varèse's use of texture as a dominant organizational principle.

CHAPTER III

PROCEDURE

The analytical procedure is designed specifically to relate Varese's writing about structure in his music to the music itself. For this reason, the study will begin by examining the nucleus, or what Varese calls the "idea"; it will then analyze the extension of the nucleus, resulting in the "external structure." The study will examine in detail the workings of the nucleus within smaller divisions, or sections, of the complete structure.

Special unifying factors--specific rhythms, timbres, groups of pitches, etc., will be analyzed in each work. If each composition is found to be constructed largely on a different component, evidence supporting the hypothesis (that Varese explores a different element in each piece) will be presented.

In particular, no mold or pattern for any work is presumed prior to analysis.

The steps to be taken in the analysis of each work are, therefore, as follows:

1. Notate the nucleus (the basis of an internal structure) from which the work evolves. Discuss the elements which compose the nucleus. (Intervals, dynamics, timbres, rhythms, pitches, sound masses, registers, tempos.)

2. Outline or diagram the large-scale structural plan--the "external structure." Give evidence supporting a division of this structure into parts. If the organization of the work appears to be built on a particular component, discuss how Varèse seems to be working with this component.

3. Further divide the parts into sections. Within the sections, examine the nucleus and its growth (or variation) as it relates to the following topics:

a. "the growth and interaction of sound masses in space through a continual process of expansion, projection, interaction, penetration, and transmutation. . . ."[1]

b. Special techniques, including inversions, retrogrades, octave displacements, permutations, or transpositions of the nucleus.

c. Repetition and varied repetition.

d. Expanding planes of sound.

e. Melodic or motivic characteristics which may occur throughout a work as unifying factors.

f. Rhythmic characteristics--varied repetition of rhythmic motifs; simultaneous rhythms; accents; metrical shifts.

g. Development, contrast, or succession of textures throughout sections.

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[1]See supra, p. 19.

h. Divisions of the nucleus which cause the formation of new patterns or shapes, related to the original nucleus, yet different from it.

i. Mutation of the nucleus--whether changes which occur are abrupt, or gradual. In this connection, the presence or absence of transitions between sections will be indicated.

4. The study of Varèse's structural procedure should help to reconcile differing points of view discussed in the introduction. In the concluding section, information from the study of Varèse's structure will be related to the subjects discussed in the introduction.

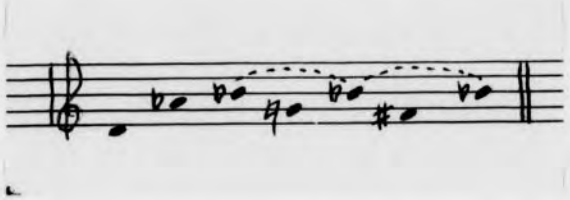
CHAPTER IV

ANALYSIS OF INTEGRALS

The Nucleus

Chou Wen-Chung, in his writing on Varèse's music, discusses what he calls the "idea" from which Integrals evolves.[1] He illustrates the composition of the "idea," or what this paper refers to as the nucleus, in this way.

Ex. 1. Integrals, Intervallic Construction of the Nucleus[2]



The nucleus is the essence of the expanding plane of sound which is heard continuously through the first section, measures 1-29.[3] The nucleus is stated first in its entirety in measure 10. The first three pitches of

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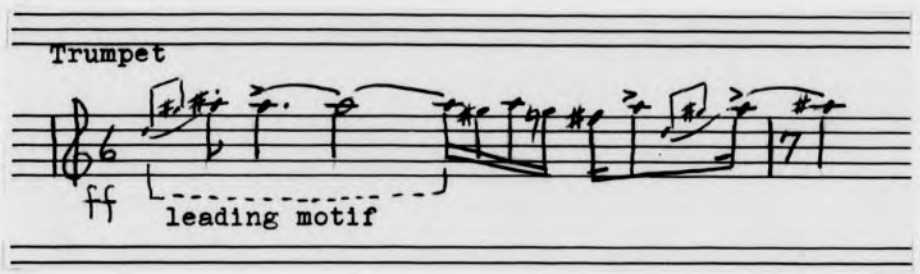
[1]Information for this section on the nucleus is based, generally, upon Chou Wen-Chung's article, "Varèse: a Sketch," pp. 148-160. Specific references are indicated in footnotes.

[2]Reprinted from "Varèse, a Sketch," by Chou Wen-Chung, p. 158.

[3]The expanding plane is a horizontal, semi-melodic strand of sound. In Integrals, it is often used as a continuous thread to connect the contrasting vertical blocks of sound.

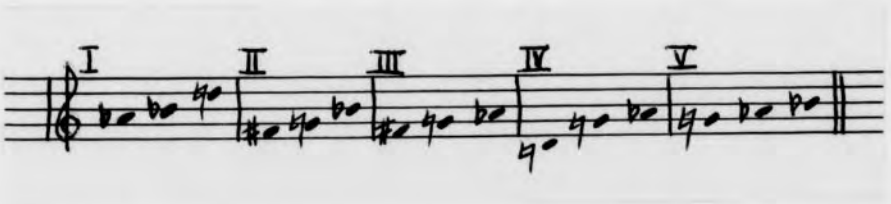
the nucleus comprise the leading motif of Integrals. This motif is heard extensively in the first two sections, and it also recurs at the end of the work.

Ex. 2. Integrals: Meas. 10, The Nucleus



Chou Wen-Chung points out that throughout Integrals, Varèse is working with different combinations of intervals, derived by splitting the nucleus into five groups. The intervallic groups, as Chou Wen-Chung illustrates them, are these.

Ex. 3. Integrals, Intervallic Groups[4]



In each group, the linear ordering (of intervals) may be varied by permutation, i.e., changes in the order of

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[4]Reprinted from "Varèse, a Sketch," by Chou Wen-Chung, p. 158.

arrangement. The groups may also be stated vertically. In this case, also, the intervals may appear in any order. Further, the intervals may be inverted, and octave displacement is freely employed as yet another means of variation.

Varèse has constructed the first two sound masses of Integrals from the above groups. The first mass, measure 5, is on the pitches A, E-flat, B-natural. The intervals--a tritone and minor sixth--are derived from group I, which has the intervallic content of the tritone and major third. Through the techniques of transposition and inversion, by rearranging the group vertically, and by using different timbres, Varese has constructed a new sound. Yet, as Chou Wen-Chung points out, this first mass may be traced directly to the nucleus.[5]

The second mass is constructed in the same way, but from group II of the nucleus. The pitches of the second mass are C, E, C-sharp (measure 5). The intervallic content of both major and minor thirds is present also in the pitches of F-sharp, G, B-flat of group II.

Varèse uses the first two groups throughout the opening section (measures 1-29). In the following section, moderato, he uses groups III, IV, and V extensively.

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[5] Ibid.

Analysis of the score thus shows that the nucleus is a very small segment contained within the expanding plane. Fragments of the nucleus are used motivically and they also appear in vertical groups as blocks of sound, or masses.

Large Scale Structural Plan

Two elements are especially important in understanding the structural organization of Integrals. The first is pitch; the second is texture. Of the two, pitch organization is perceptible more to the eye than the ear, and therefore is revealed through analysis of the score. Textural organization, on the other hand, is perceived by listening. Indeed, it is through texture that the listener comprehends the progression of large blocks of sound as they move in an ordered course throughout Integrals. Also, through texture, the listener recognizes the overall symmetry and balance of the work.

A discussion of each element follows.

Pitch Organization

The previous chapter described Chou Wen-Chung's analysis of the intervallic groups in Integrals. The writer's analysis of the score led her to pursue this discussion further through two fundamental questions.

1. What is the significance of the transpositions of groups I and II in the opening section?

2. What is the significance of the eleven pitched instruments among which the groups are divided, and for which Integrals is scored?

The answer to these questions is found in the discovery of Varèse's systematic use of total chromaticism which underlies the pitch structure of Integrals. Together with Chou Wen-Chung's discussion of intervallic groups, the discovery of total chromaticism in Integrals helps to clarify, on a technical level, the way in which Integrals is constructed.

Varèse's chromaticism is evident especially at cadences, although it is by no means limited to them. The selected examples which follow are those at cadence points. From them one can see that Varèse, while not specifically using an ordered row, is using the twelve pitches in a way closely related to serialist technique.

1. In the Andantino (measures 1-29), the transposition of groups I and II of the expanding plane (with the original plane itself) results in the use of eleven pitches up to measure 25. The F, the omitted pitch, appears at measure 25 signaling the upheaval at the cadence. The F remains, other pitches are reshuffled and reorganized to form a tutti mass (measures 27-29) which now includes all chromatic pitches except C. The following Moderato section, in turn, begins on an extended and emphasized C as one of two bass notes.

2. The Moderato, while employing all 12 pitches, consistently omits B-flat from the final tutti sound of each repeated sound block. The final tutti sound is important in that it represents a stationary level and a completeness not present in the construction preceding it. The B-flat is the first note to appear in the new motif of the Allegro which follows measure 54. The B-flat is further emphasized by its repetition as the highest note of an extended mass, beginning at measure 55.

3. The Allegro ends on a ten-note mass, which includes all pitches except C and B. The C and B appear, predictably, as the beginning notes of the following Subito Lento (measure 71). They are extended and are also further emphasized by their location in the highest register.

4. The Subito Doppio Piu Lento ends on a tutti cadence of eleven pitches (measure 122). The twelfth note, D, appears as the opening note of the following section (measure 123). The D is doubled, and is emphasized melodically in this section.

This procedure of joining sections with the remaining twelfth pitch is repeated with such consistency that it constitutes a significant structural principle throughout Integrals. Further instances of this practice will be pointed out in the detailed analysis.

Such evidence indicates that Varèse clearly had a particular type of twelve-note chromaticism in

mind when he scored Integrals for eleven pitched instruments.

Textural Organization

While the pitch organization of Integrals is difficult to hear, textural organization is perceived clearly and immediately. In general, this texture is polyphonic. However, Varèse's use of polyphony is different from that of traditional music, in a highly original way. Instead of writing for individual voices, or lines, Varèse writes for distinct bodies of sound; his polyphony is the result of the interaction of these bodies as they "collide," go their separate ways, or form into layers of sound.

Such a distinction was apparent to Rosenfeld, when he spoke of Varèse's polyphony as composed of "cubes";[6] or to Chou Wen-Chung when he pointed to groups of sounds.[7] Varèse himself says that early in his career he began to think of music as "bodies of intelligent sound moving freely in space."[8]

Thus, although Integrals is scored for traditional instruments, and employs some of the familiar textures (such as antiphonal or chordal), the overall textural effect is

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[6]Rosenfeld, Musical Impressions, p. 77.

[7]Chou Wen-Chung, "Varèse, a Sketch," p. 158.

[8]Edgard Varèse, "Spatial Music," in Contemporary Composers, p. 205.

strikingly new. Bodies of sound, in contrast to polyphonic voices, indeed add a new dimension to Varèse's music.

Each body of sound in Integrals is composed of intervals derived from the nucleus of the expanding plane. Each has specific characteristics of register, timbre, dynamics, attack and decay. Although the size may vary--from two to a large number of instruments, each body is an entity, a fused unit of sound.[9]

The bodies of sound are arranged in various shapes. For example, a characteristic arrangement in Integrals is the wide separation of high and low bodies, interlaced with a single strand of sound. Because the sound groups form distinct layers of sound, the term stratification seems appropriate in describing this particular texture.

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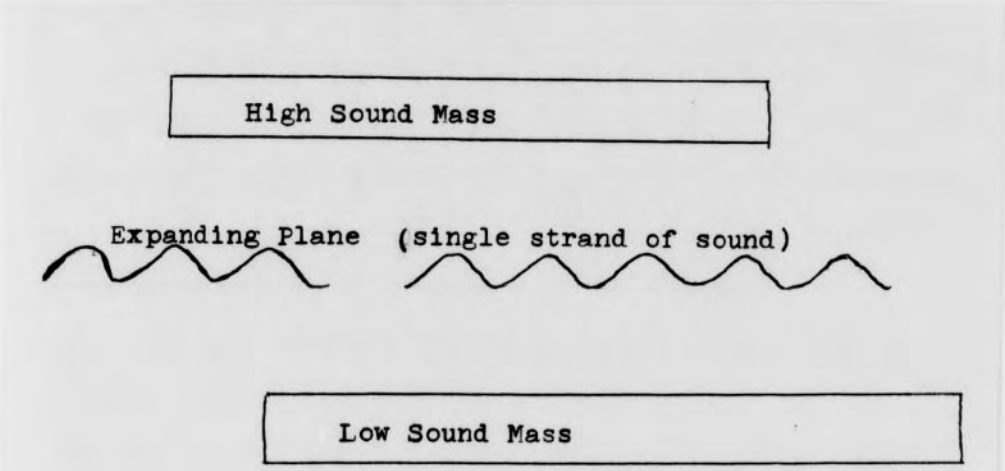
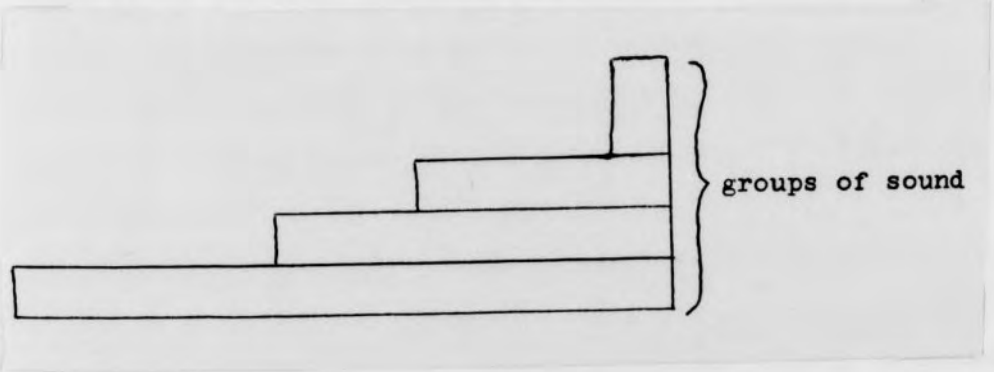
[9]In the above description the writer does not mean to imply that a sound body is a fixed unit, incapable of growth or change. More often, the opposite is true. Sound bodies frequently expand or contract in size, or shift in instrumentation. The essential point is that each body presents a blend of sound, indivisible to the listener's ear. Changes which occur are incorporated into this blended sound.

Ex. 4. Integrals, Diagram of Stratified Texture



Again, Varèse uses a pyramid effect in shaping the bodies of sound. The component bodies combine to form a mass of extended proportions. The texture of the pyramid mass is also that of stratification because of the distinct layers of sound which compose it.

Ex. 5. Integrals, Diagram of Pyramidal Stratification



The relationships which the bodies form with one another constitute the texture.

When Varèse presents a texture, he tends to maintain it over a span of time. Also, the shape presented by the texture is usually large and distinct. For these reasons, it is through texture that the listener can follow the broad outline of the work.

Such a textural outline of Integrals seems to suggest three main divisions, or parts.

Part I. The Andantino begins with the soloistic expanding plane. High and low bodies of sound enter, moving in parallel layers to the plane and to one another. Varèse prolongs this texture, by means of varied repetition, over a lengthy span of time.

Part II. An abrupt textural transformation marks the beginning of a new part, the Moderato. The bodies of sound are now arranged in pyramids--a textural shape which will be discussed more fully in the detailed analysis. Part II is the most animated and dynamic of the three parts. It consists of a number of different textural transformations which define various sections. They follow one another with increasing rapidity, gathering momentum and intensity through their quickened succession. Cadences correspondingly become less frequent as the textural spans become shorter. Intensity reaches its peak in the antiphonal section, where juxtaposed blocks of sound

alternate at their most rapid pace. The motion created by textural flux slackens at the end of part II, in preparation for the conclusion.

Part III. Monophonic texture returns with the oboe solo, which opens part III. The texture continues to recall that of part I, when in part III other bodies of sound enter, moving in parallel layers to one another and to the expanding soloistic plane of the oboe. Part III proceeds with free variation and expansion of previous material. However, by initially returning to, and emphasizing the opening texture of the Andantino, Varèse has given the completed structure symmetry and balance.

Detailed Analysis of Sections

Part I

Opening, measures 1-29. The texture of the andantino section is formed by four bodies of sound moving parallel to one another until the final cadence (measures 27-29). The bodies of sound are (a) the expanding plane; (b) the high sound mass; (c) the low sound mass; and (d) the unpitched percussion group.

Each is made separate and distinct by differences of register, timbre, pitch, rhythm and dynamics. Each is, in Varèse's own description, a non-blending "zone of intensity."[10]

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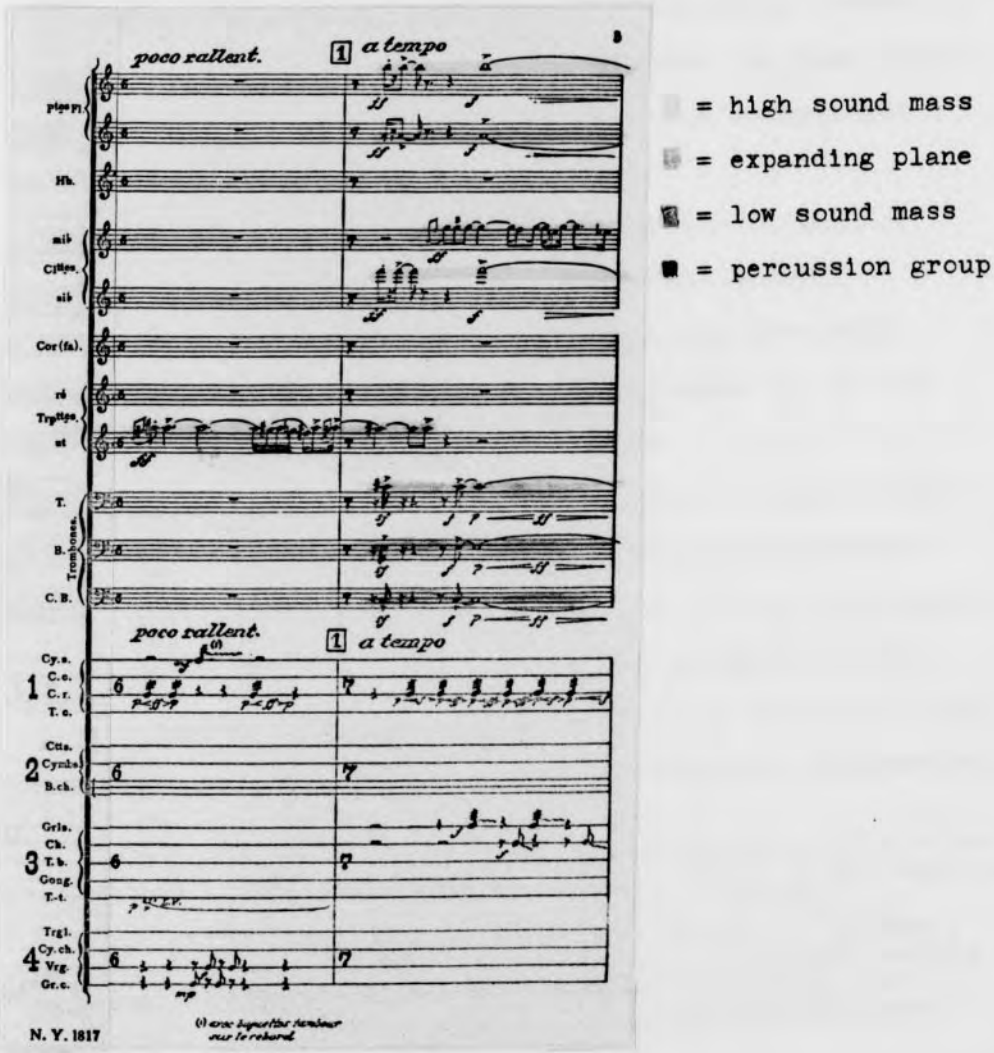
[10]Varèse, "New Instruments," p. 197.

The effect, that of layers of sound, is one which Varèse uses often in Integrals.

In measures 10-11, below, one can see the separation of sound groups as well as their parallel motion.

Ex. 6. Integrals: Meas. 10-11, Separation of Sound Groups



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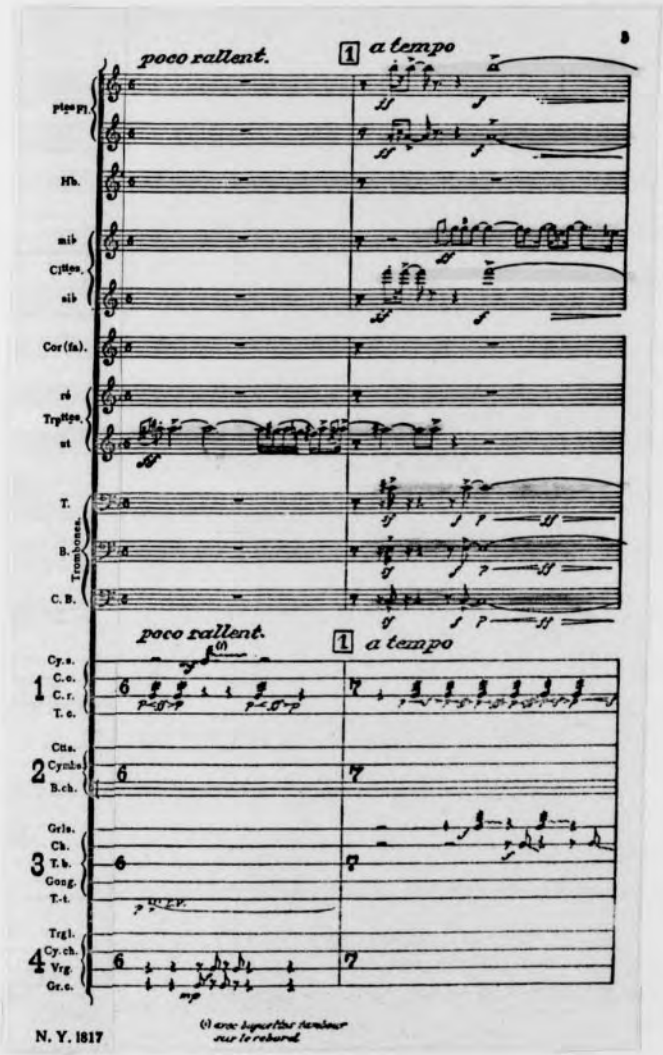

The low sound mass, played by the trombones, is constructed on the major-minor third, derived from the nucleus of the expanding plane.

The high sound mass, played by the piccolos and the B-flat clarinet, is constructed on the tritone plus minor sixth, also derived from the nucleus.

The expanding plane, although varying in timbre, remains in the middle register and repeats the same intervals and pitches throughout part I. The C trumpet and E-flat clarinet share the plane.

The percussion group, throughout the Andantino, is rhythmically independent from the other groups.

The sound groups vary in length, but otherwise remain constant until the final bars of part I. Eleven pitches are present, through measure 24.

At measure 25, a new semitone group on the pitches E and F, played by trumpets, causes an immediate reaction throughout the final measures of part I. (F is the twelfth pitch, not heard thus far.) Its semitone construction becomes grafted on to both higher and lower masses.[11] The two bodies of sound expand upward and downward, respectively,

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[11]For further discussion of the intervals of the new semitone mass that suddenly activates changes in the high and low masses, see Chou Wen-Chung's article, "Varèse: A Sketch," p. 159. His description corresponds to Varèse's statement on sound bodies: "Certain transmutations taking place on certain planes will seem to be projected onto other planes moving at different speeds and at different angles . . ." See supra, p. 18.

and both acquire the semitone nature of the new mass.[12] The pitches of the cadential mass are: A, B-flat, B-natural (lower group); F-sharp, G, G-sharp (higher); E, F (middle); and E-flat, D-flat, D-natural (also a middle register group). Thus measure 25 is a critical point of transformation. The introduction of the semitone interval acts as a small, but highly significant mutation of the nucleus which alters the entire course of events which follows. What before had been static and repetitious begins to change and grow. The latent energy of the nucleus is released and Integrals is set into motion.

The new masses are no longer separated by wide distances between their registers; instead, they have become components of a composite mass, built of eleven pitches (C is omitted), and spanning the distance from the trombone's A to the piccolo's G-sharp. Chou Wen-Chung speaks of this new texture as a "collision" of sound masses.[13] By this, he seems to mean that the masses are no longer in separate "zones" but are merged through registral closeness and through similarity of rhythm.

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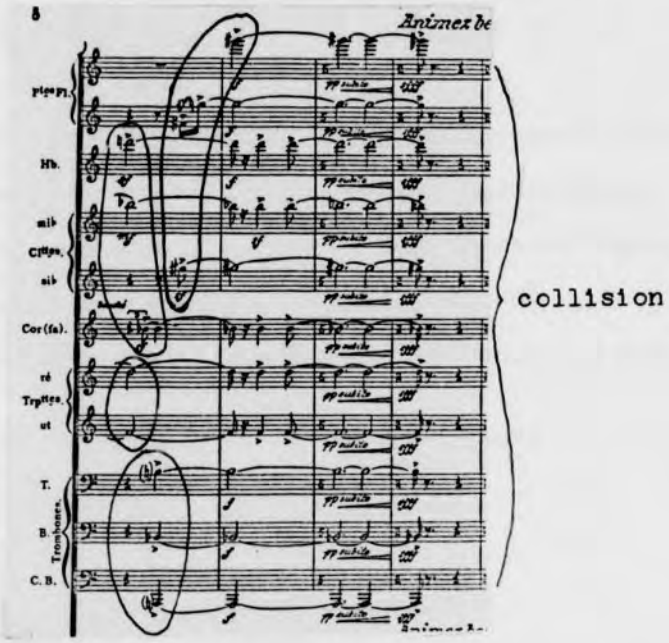
[12]Both low and high masses have, up to this point, remained on the same registral levels. Therefore, one can see the extent of expansion by comparing the masses in measure 11 (example 6) to those of the same instruments in measures 27-29 (example 7).

[13]Chou Wen-Chung, "Varèse, A Sketch," p. 159.

Ex. 7. Integrals: Meas. 26-29, Collision of Sound Masses Showing Individual Chromatic Groupings



Part II

Part II is composed of a number of textural transformations. Intervals derived from the nucleus are the core of various sound groups which, in turn, combine to form larger musical shapes or designs. Each of these larger arrangements comprises a particular texture. Textural transformation is the subject of the paragraphs which follow.

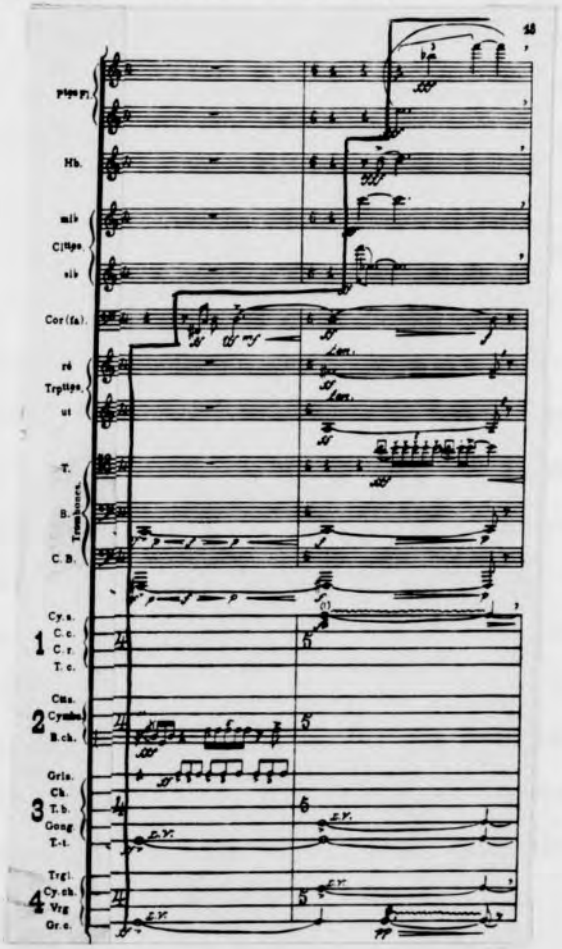
First Transformation, Measures 32-52. In the moderato section, the bodies of sound are arranged in shapes resembling pyramids. The percussion group joins the trombones to form the bass (and base) of the pyramid. The pitches are F-sharp and C; C is the remaining chromatic pitch of the preceding cadence. The top of the pyramid, entering

last, is formed by the piccolos. Each pyramid is totally chromatic. However, B-flat is consistently omitted from the final tutti sound of each pyramid, since it is the only pitch not held by ties.

As the Moderato progresses, the pyramids grow thicker in texture by the addition of instruments. The pyramids vary in length, as well as in rhythm. Varied repetitions of the pyramids continue throughout this section.

The following measures illustrate one such pyramid.

Ex. 8. Integrals: Meas. 49-50, Pyramid of Sound



Sound masses are derived from the original intervallic groupings described on pages 35-36. They are as follows:

a. Low trombones and French horn: tritone plus fifth (group IV).

b. Trumpets and tenor trombone: minor third plus major seventh (group V).

c. Oboe and clarinets: inverted semitones (group III).

d. Piccolos: tritone plus perfect fifth (group IV).

The first transformation, while departing from the opening by presenting a completely new texture, yet has direct similarities to it. Both emphasize the leading motif, the first three pitches of the nucleus. Both are extended in length (the Andantino is 29 measures, and the Moderato is 21 measures); and both present numerous repetitions of a particular texture.

In contrast, the sections which follow are shorter. Textural spans are no longer repeated in immediate succession; instead, after the initial presentation, the section proceeds toward a cadence. This process is continued through the remainder of part II with increasing rapidity. Cadences, present at the beginning of part II, become less frequent as textural succession becomes more rapid. Thus the activity in the following sections increases by compressing more textural variety into smaller segments.

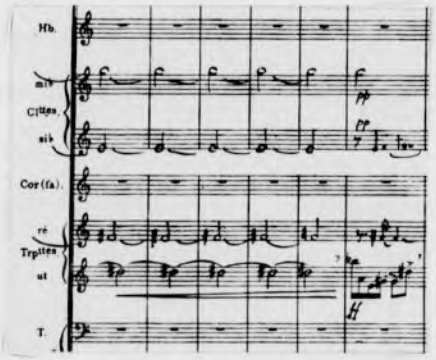
Continuous textural fluctuation becomes an important element in building the mounting intensity.

Second Transformation, Measures 53-69. The tritone is split open and it now encloses the perfect fifth (derived from group IV). The B-flat, omitted from the final tutti sound of each pyramid is placed prominently as the highest pitch.

Ex. 9. Integrals: Meas. 55-60, Enclosure of an Intervallic Group

group I

group IV



While Varèse often inverts the intervals within the groups, the preceding example of widening an interval to enclose another is unusual in Integrals. Timbral groupings more commonly are separated from one another by distances between their registers.

In measure 63, the Allegro section moves toward its cadence. Other sound groups enter and the texture first expands higher (measure 66), and subsequently lower (measure 69). Cadencing with sound groups in the lower register acts, in part, to balance the previous section

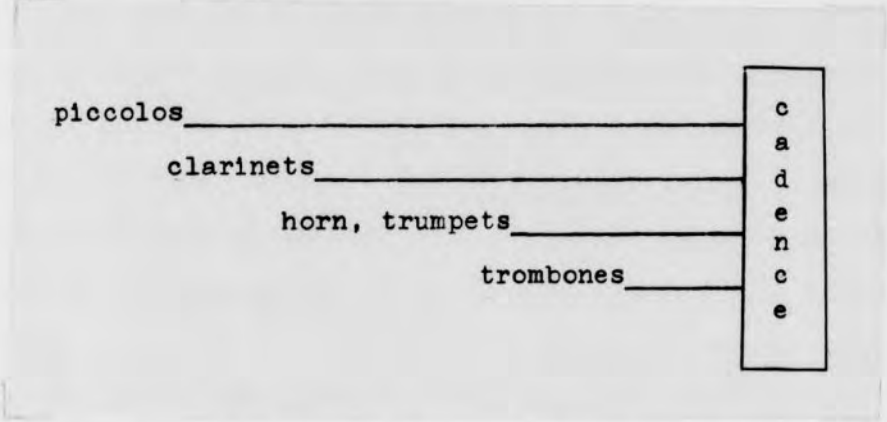
in which the sound groups continuously shot upward with the piccolos ending each pyramidal structure. The downward motion is further continued in the next section.

By ending on a cadence of smaller scope-- in range, timbre, and pitch content--the motion between sections becomes more continuous. This is one of many instances in part II where Varèse lessens the divisions between textural spans. Cadences here are usually smaller, and more transitional in nature in contrast to their earlier use as divisions between sections.

Third Transformation, Measures 68-78. Four masses compose the section marked Subito Lento: two masses in the high register, the uppermost of which is constructed on the pitches C and B, those omitted in the previous cadence; one mass in the middle register; and one mass in the low register. Layers of sound return and they are arranged in the shape of an inverted pyramid, with entrances consecutively presented from high to low registers. At the cadence (measures 77-78) the high masses expand upward, the middle remains constant, and the low mass expands downward.

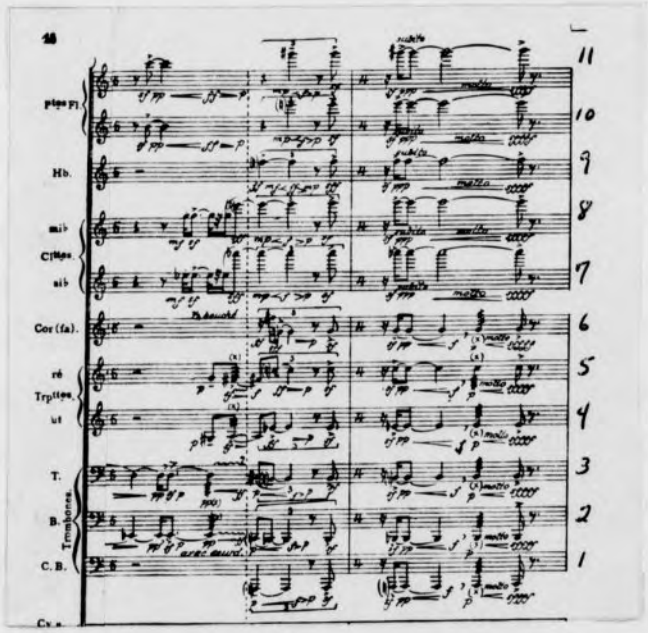
The textural arrangement may be diagrammed in this way.

Ex. 10. Integrals, Diagram of Inverted Pyramid



The tutti cadence is composed of eleven pitches.

Ex. 11. Integrals: Meas. 77-78, Cadence of Eleven Pitches



However, the continuation of this cadence differs markedly from other tutti cadences in Integrals. At this point, Varèse departs from his usual practice of bringing in the omitted pitch, D-flat, as the final pitch which would conclude the chromatic group. Instead, he continues the next section, Presto, with a reorganization and extension of the preceding eleven pitches. It is only after the completion of a new textural span (measures 79-92) that the D-flat finally appears. The location (measure 93) is particularly dramatic. The D-flat is persistently repeated as the bass pitch in a highly unusual chordal passage--unusual because it is in direct contrast to the prevailing polyphonic texture of Integrals.

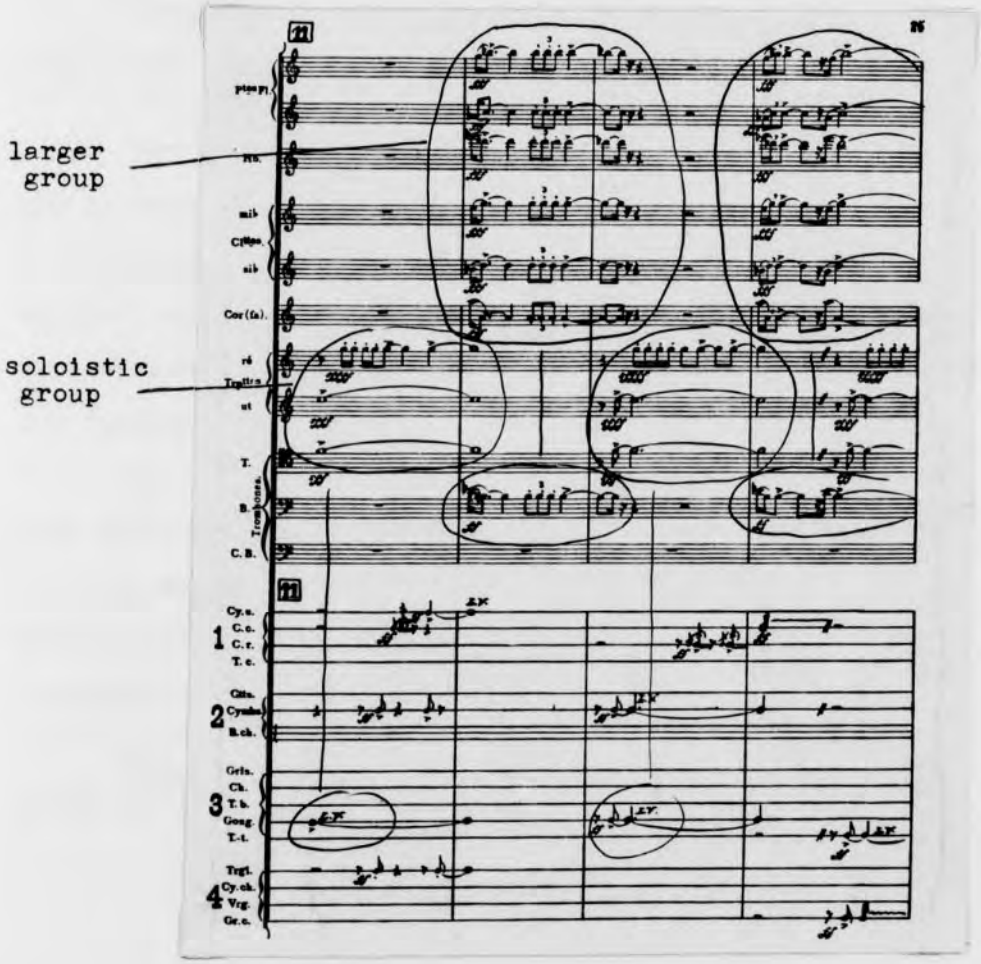
The pitch analysis thus reveals that Varèse's intention is to connect, or overlap, the Subito Lento with the Presto by holding the D-flat in reserve until the second textural span of the Presto. The forward motion characteristic of part II is therefore continued, rather than interrupted by the cadence.

Transformations Four Through Eight, Measures 79-150. Coincidental with pitch continuity, the pace of textural change is further accelerated in the Presto. The textures follow one another--five in all--in a quickened succession which only infrequently is interrupted by cadences. When a texture ends, it is either overlapped or elided with the following texture. The continuous textural motion results in

an ever-increasing intensity, perhaps comparable to that which arises from continuous harmonic motion in tonal music.

The peak of intensity of Integrals occurs in the antiphonal passage (measures 105-117) of the Presto. A smaller group, led by trumpet solo, is balanced, concerto-like, against a larger mass composed of the rest of the orchestra.

Ex. 12. Integrals: Meas. 111-114, Antiphonal Texture



Textures, which have been succeeding one another with increasing speed, are now alternating at their most rapid pace.

Also during the climax, Varèse includes all twelve notes of the chromatic scale. Total chromaticism continues in each reiteration of the antiphonal segment. Two octave doublings add strength to the large body of sound (measure 112): the first piccolo is doubled by the first clarinet: the second piccolo is doubled by the second clarinet.

Triple and quadruple forte markings, maintained throughout the antiphonal segment, reinforce the climax.

The antiphonal texture has been discussed first, and in some detail, because of its structural importance as the climax of Integrals. The Presto, as mentioned earlier, consists of a number of textures in addition to the antiphonal texture. These textures and their locations are described below.

1. Measures 79-92 (Fourth Transformation). Whole tone and semitone groups move in parallel layers to one another, while a third group, shorter in length, moves in oblique motion to the above layers. The eleven note pitch construction is continued from the previous cadence.[14]

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[14]For a discussion of this pitch continuity, see supra, p. 54.

2. Measures 92-100 (Fifth Transformation). The texture is chordal. This striking passage is unlike all previous textures, which have been consistently polyphonic. The simplicity of intervallic construction in this segment corresponds to the simplicity of the chordal texture. The low group (trombones) is constructed on perfect fifths. The D-flat, omitted from the previous section, is repeated persistently by the contrabass trombone.[15] The middle group (trumpets and horn) is constructed on the unison. The rhythm of the percussion group coincides with that of the pitched instruments.

3. Measures 101-117 (Sixth Transformation). The prevailingly antiphonal texture of these measures has been discussed previously on pp. 55-56.

4. Measures 118-126 (Seventh Transformation). The pace of textural flux slackens as the antiphonal passage is resolved by a series of three cadential pyramids. The first two pyramids are constructed of semitone groupings, and the final one is totally chromatic. After abandoning the full 12-note cadence in favor of continuous motion early in part II, Varèse now returns to the earlier type of cadence.

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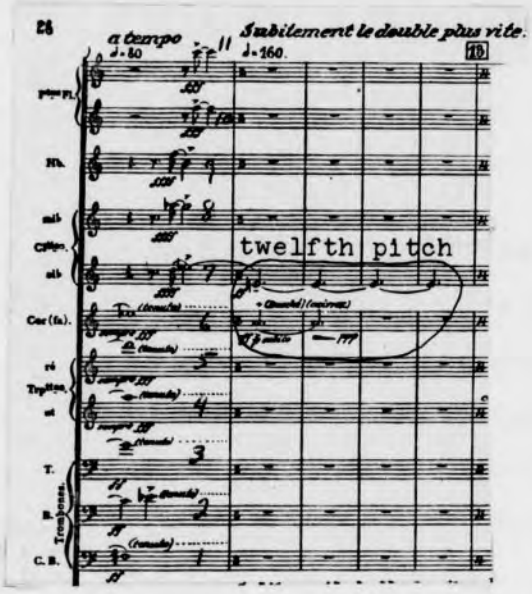
[15] See supra, p. 54, for a discussion of this particular use of the 12 pitches.

Ex. 13. Integrals: Meas. 122-126, Cadential Resolution on Twelfth Pitch



The clarinet's pitch, D (measure 123), is the final tone of the 12-note structure. It is also a link to the following passage, which begins on D and continues to emphasize this pitch. The motion of continuous textural change, although slower, is thus carried forward by this link into the remaining measures of the Presto.

5. Measures 127-150 (Eighth Transformation). Varèse returns to the chordal texture of measures 93-100. The structure of the intervallic groups is varied when in measure 131 ff. he uses minor third, and tritone plus fifth groupings. The chordal texture is continued to the cadence, with brief references to the antiphonal texture in measures 140 and 146. The cadence is a tutti mass of

eleven different pitches, similar to those at the conclusions of the Subito Lento and the Andantino. F is the omitted pitch. The cadence is resolved in the customary way by using F as the first note of part III, which follows.

Part III

Part III is both a return to earlier material and the continued variation and expansion of this material. It is also something extremely surprising and original. It is as if the initial material, having undergone a series of transformations, now emerges as a new and different musical substance--a transmutation of its earlier state. Transmutation, in contrast to transformation, connotes a change from a lower to higher element, as in turning base metals into gold.[16] Integrals appears to undergo a similar process of transmutation. Evidence in support of such an interpretation is offered in the following comparisons between part I and part III.

1. The soloistic expanding plane in part III is much richer in pitch and registral variation than is its repetitious counterpart at the beginning. In part III,

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[16]The distinction between transformation and transmutation is made in Webster's New Collegiate Dictionary. It is interesting to note that the title of Varèse's work, Arcana, also suggests a relation to transmutation. The word, arcana, has special reference to the ancient science of the alchemists, who sought to turn base metals into gold.

the expanding plane has become what may be called (without qualification) a bona fide free-flowing melody.

2. The timbre of the solos in part III, now given to the oboe, includes the full spectrum of the harmonic series, and is therefore a richer and more complex sound as contrasted with the clarinet and trumpet solos at the beginning.

3. In part III, sound masses are treated with greater flexibility and variation. In contrast to the two static masses of part I, part III contains numerous masses treated in a variety of ways. The layered masses in part I always remain constant.

4. The overall structure of part III also appears to be an aspect of transmutation, since its form is comparable to that of part I, but on an expanded scale. The framework of part III is vividly defined by three oboe solos that occur at measures 157, 187 and 196. The outline of part I is, by comparison, less clearly defined. However, it too is fundamentally based upon three presentations of the soloistic expanding plane, occurring in different timbres. The expanding plane, it is recalled, is the semi-melodic line with which Integrals opened; it extends the length of section 1 (see p. 34). By returning to the monophonic texture in part III, Varèse immediately recalls the opening of Integrals. More significantly, by using this solo texture as the basis of the structural

outline in part III, he has given symmetry and balance to the opening and closing parts.

In the above instances, transmutation acts to radically alter familiar material, so that the process of evolving new ideas out of old continues to the end.

The following paragraphs discuss the music in each of the three sections which are defined by the oboe solos.

First Oboe Solo, Measures 151-187. The oboe begins its expanding plane (measure 157) on an extended F. The F is, structurally, also the completion of the previous cadence (measures 149-150), which consisted of a tutti chord composed of all notes of the chromatic scale except F.

Varèse follows this same cadential procedure at the end of the section (measures 186-187). In this instance, the tutti cadence is constructed of the entire chromatic scale except for F-sharp. The second oboe solo, which opens the second section of part III, resolves into F-sharp and continues to emphasize it.

The texture of the first section distinctly recalls that of the opening Andantino. The expanding plane is again projected against various sound masses, which move in parallel layers. Variations on this principle are extensive, however, Varèse now treats the moving bodies with increased freedom and complexity. This flexibility is accomplished in the following ways: (a) new interval relationships occur within the masses; (b) changes are made

in the melodic contour of the expanding plane; and (c) there are variations in the number of masses heard simultaneously. Such factors indicate the scope of transmutation of the initial material.

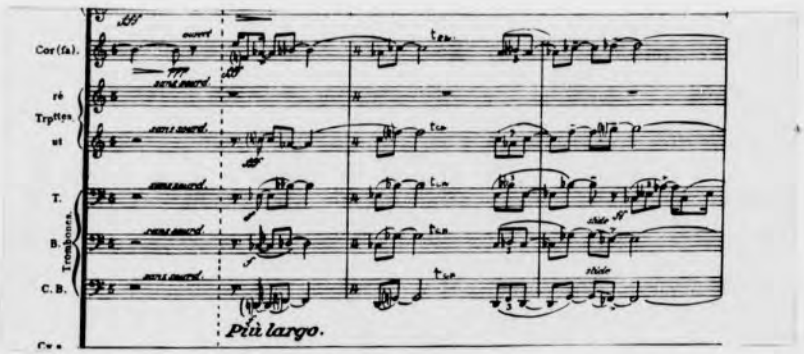
Varèse restates a number of motives in the short span of this section. The original expanding plane, absent since part I, returns in measures 164-177. The trumpet motif (part II, measure 54) returns in the piccolo (measure 168) and again in the clarinet (measure 181). Also, the trombone motif from the pyramid episode (measures 32-52) returns in measures 181-186. A brief reminder of the motif from the antiphonal passage is heard in measure 180.

Second Oboe Solo, Measures 187-196. Varèse now foregoes further recall of earlier textures in favor of a new development. For a brief period, the bodies of sound lose their cohesion, disintegrate, and each instrument goes its own way. The result, a polyrhythmic, polymotivic "collage" of sound, is indeed unusual for Integrals. Familiar motivic fragments are present in each voice, yet the overall texture has no shape comparable to those textures previously described. One thinks of the "pyramid" shape; the layered masses interlaced with the expanding plane; or the juxtaposed blocks of sound in the antiphonal section. None of the order implicit in these arrangements is present here. For a very brief span, chaos (caused by each instrument going its own way) replaces the order so fundamentally present before, and after.

Third Oboe Solo, Measures 196-220. Following the third solo passage, individual voices return once again to their cohesive groups. The groups are, as previously, arranged in large shapes, all of which shapes are familiar. The expanding plane is heard above a single mass (measures 199-201); the antiphonal blocks of sound reappear (measures 202-208); and a single pyramid emerges (measures 210-213).

Varèse closes Integrals with a transmutation of the expanding plane. The expanding plane, which has remained monophonic until this point, now consists of the fusion of several timbres. The linear writing recalls the opening measures, but the enrichment of timbres suggests that the plane now has become a new musical substance.

Ex. 14. Integrals: Meas. 214-216, Transmutation of the Expanding Plane



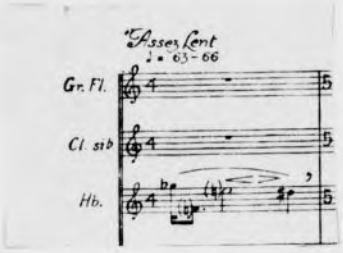
CHAPTER V

ANALYSIS OF OCTANDRE

The Nucleus

The nucleus from which Octandre evolves is stated in measure one.

Ex. 15. Octandre: Meas. 1, The Nucleus

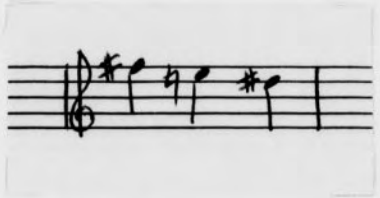


As the work unfolds, Varèse uses this nucleus primarily in two ways: first, as a group of specific pitches which recur at particular locations throughout the work; and second, as a collection of intervals capable of being shaped into various groups, or sets. The groups derived from the intervallic relations present in the nucleus are as follows:

Group I. Original group, i.e., that of example 15, above.

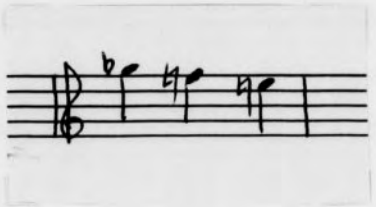
Group II. Descending minor third, which is the principal motif throughout the work. The pitches of group II are the same as the upper register notes of example 15.

Ex. 16. Octandre, Intervallic Group II



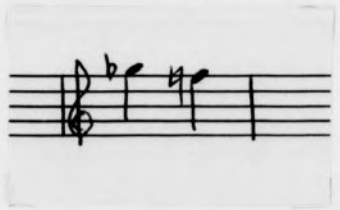
Group III. Set of two semitones.

Ex. 17. Octandre, Intervallic Group III



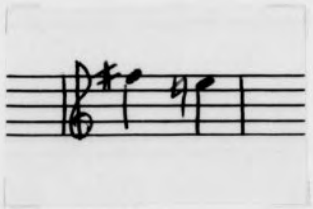
Group IV. One semitone.

Ex. 18. Octandre, Intervallic Group IV



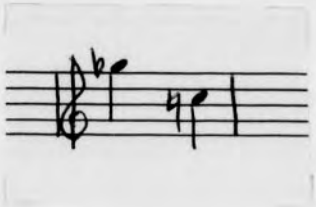
Group V. The whole tone.

Ex. 19. Octandre, Intervallic Group V



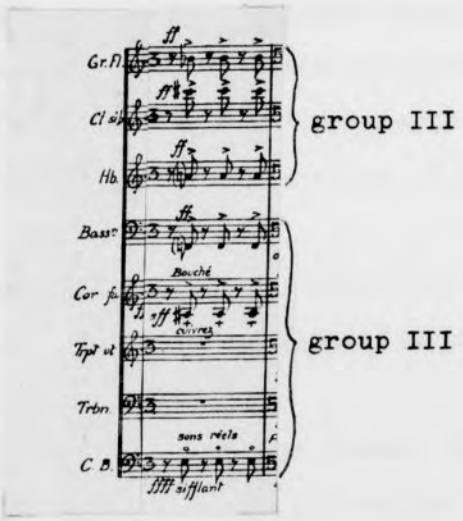
Group VI. The tritone.

Ex. 20. Octandre, Intervallic Group VI



The above groups are often found in pairs which may occur either horizontally or vertically. In the latter case they frequently form sound masses. Below is an illustration of such a mass from movement I, measure 20.

Ex. 21. Octandre: Movement I, Meas. 20, Sound Mass Composed of Paired Groups



The groups may be transposed; octave displacement is prevalent; and the groups are further varied by techniques of inversion and retrograde.

Large-Scale Structural Plan

Octandre is in three movements. However, there is no decisive break between the movements. Movement I ends with the direction *attaquez*; movement II ends with the direction *enchainez*. Therefore, like *Integrals* and *Ionization*, *Octandre* also is continuous from beginning to end.

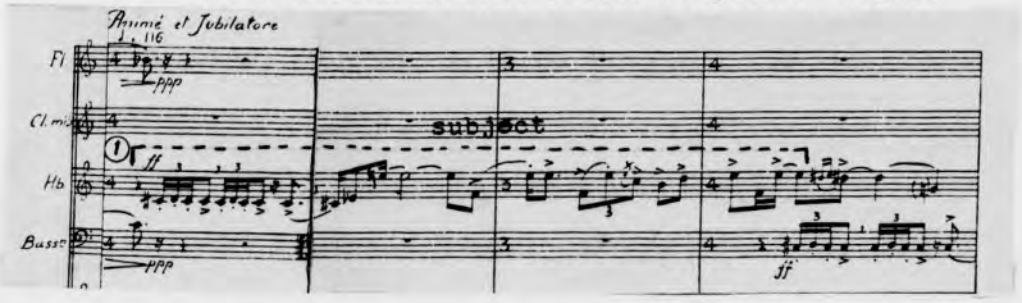
The structure of the work is determined through Varèse's use of the original nucleus on the pitches G-flat, F, E, D-sharp. This pitch group is stated horizontally three times at the beginning (measures 1-3). The first three notes (G-flat, F, E) reappear vertically at the opening of movement II (measures 1-25). These pitches then separate and become independent of one another. Each becomes the center or focal point, for new and later transposed groups. The body of movement II is constructed on these new groups. G-flat, F, E, D-flat (the pitches of the nucleus) then coalesce and return as a unit at the close of movement II (measures 78-81).

Following a departure, the original pitch group returns at the final section of movement III (measures 46-60) where it is repeated persistently.

It is evident, therefore, that Varèse works with a group of particular pitches which determines the structural framework of *Octandre*. The element of pitch, therefore, is of primary importance to the formal plan.

In addition to pitch, the process of transmutation is a significant factor in the structure of Octandre. Transmutation was discussed previously in the analysis of Integrals.[1] In Integrals, it was found that the initial expanding plane, static and repetitious in part I, evolves into three oboe melodies which are used as the basis of the structure of part III. The transmutation in Octandre follows a parallel course. In Octandre, the initial material of movement I is transformed into the subject of a fugato in movement III. The fugato is the basis of the structure of movement III, and extends the length of the movement. The transmutation, therefore, is a fundamental change which involves movement III in its entirety. One can, however, observe the immediate effect of transmutation on the nucleus by comparing the original material (example 15, measure 1) to what it eventually becomes in movement III, measures 9-12.

Ex. 22. Octandre: Movement III, Meas. 9-12, Intervals Derived from Nucleus Become Subject of Fugato



[1]See supra, pp. 59-61.

The same intervals are present in both examples: i.e., the semitone and minor third. Also, both are scored for oboe solo. The effects of transmutation are evident in these alterations, as follows.

1. The melodic line in example 22 is expanded into a fugal subject of some length, in contrast to the short and repetitive motif of example 15.

2. The minor third interval in example 22, measure 10, appears in retrograde and is further varied by octave displacement. This version radically alters the nature of the original nucleus, since the original descending third has been heard repeatedly as the principal motif of the work.

3. The answer of the fugal subject (example 22, measure 12) sets into motion the fugal procedure which is the basis of the entire movement. The transmuted nucleus, now used as the basis of the fugal procedure, therefore constitutes the essence of transmutation in Octandre.

Detailed Analysis of Sections

Movement I

Section 1

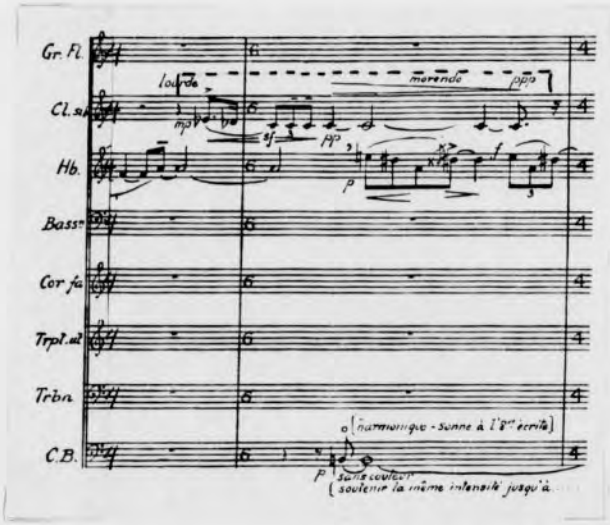
Measures 1-3. The oboe opens the work with three consecutive statements of the nucleus. Each repetition is slightly varied.

Measure 4. The nucleus is transposed to D, C-sharp, C, B. This melodic sequence, on the adjacent lower pitches

of the chromatic scale, constitutes a pair with the original pitches: G-flat, F, E, D-sharp; D, C-sharp, C, B. (The frequency of such pairing will become apparent during the course of the analysis.) Having left the original group of pitches (G-flat, F, E, D-sharp) in measure four, Varèse will not return to this group until the opening measures of the second movement.

Measures 5-6. The clarinet enters with the leading motive of the work. Its pitches are D-flat, C-flat, B-flat, which are a transposed version of group II.

Ex. 23. Octandre: Movement I, Meas. 5-6, The Leading Motif



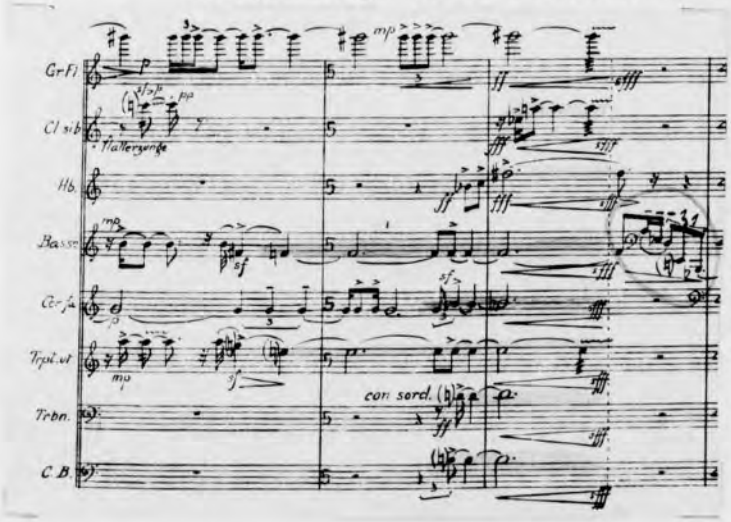
Measures 6-12. The oboe line continues to expand, adding various transposed groups of intervals derived from the original nucleus. Thus from group IV, E to D-sharp,

as well as A to G-sharp appear. F-sharp, F, E; and B-flat, C, B-natural are derived from group III. The tritone (from group VI) also appears as part of the expansion.

Entrance of the flute, clarinet and trumpet in measure 10, and the bassoon and horn in measure 11, lead to the first sound mass which occurs in measures 11-12. This mass consists of two groups of sound, the pitches of which are: G-sharp, F, F-sharp; and C, B, A--both derived from group II.

Measures 13-15. The mass continues to grow (as lower timbres are added to higher) until measure 15, where the trombone and double bass enter and all instruments play simultaneously. The mass is composed of vertical groupings of intervals which have been heard repeatedly in the previous measures as melodic intervals. The groups, identified by color according to register, are shown below.

Ex. 24. Octandre: Movement I, Meas. 13-15, Intervallic Groups Merge to Form Cadential Mass

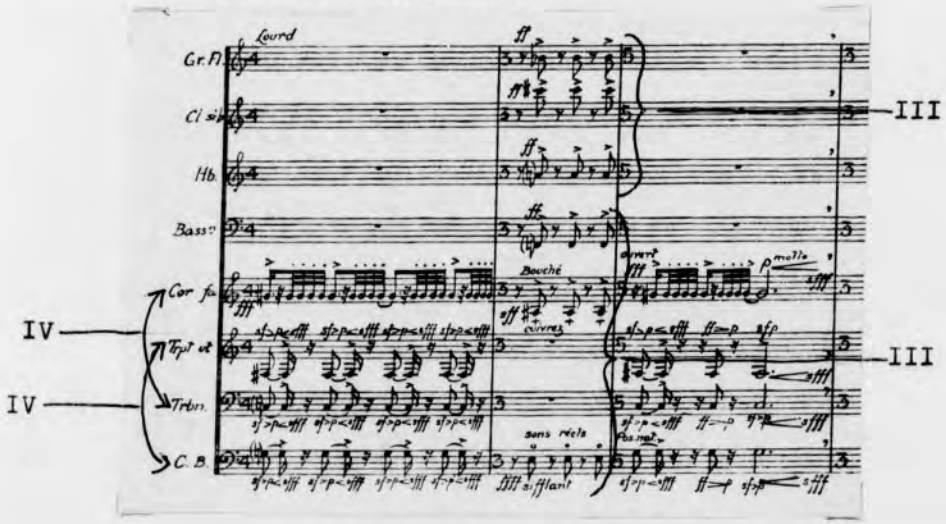


Measures 16-18. The mass contracts to its smallest and lowest point in measure 16. The bassoon and horn play B-flat, C-sharp, from group II. In measures 17-18, the mass expands again, but does not reach the proportions of the previous tutti. The double bass is omitted, and the total registration is narrower. The mass appears to have leveled off, and forms the close of section 1, first movement.

Section 2

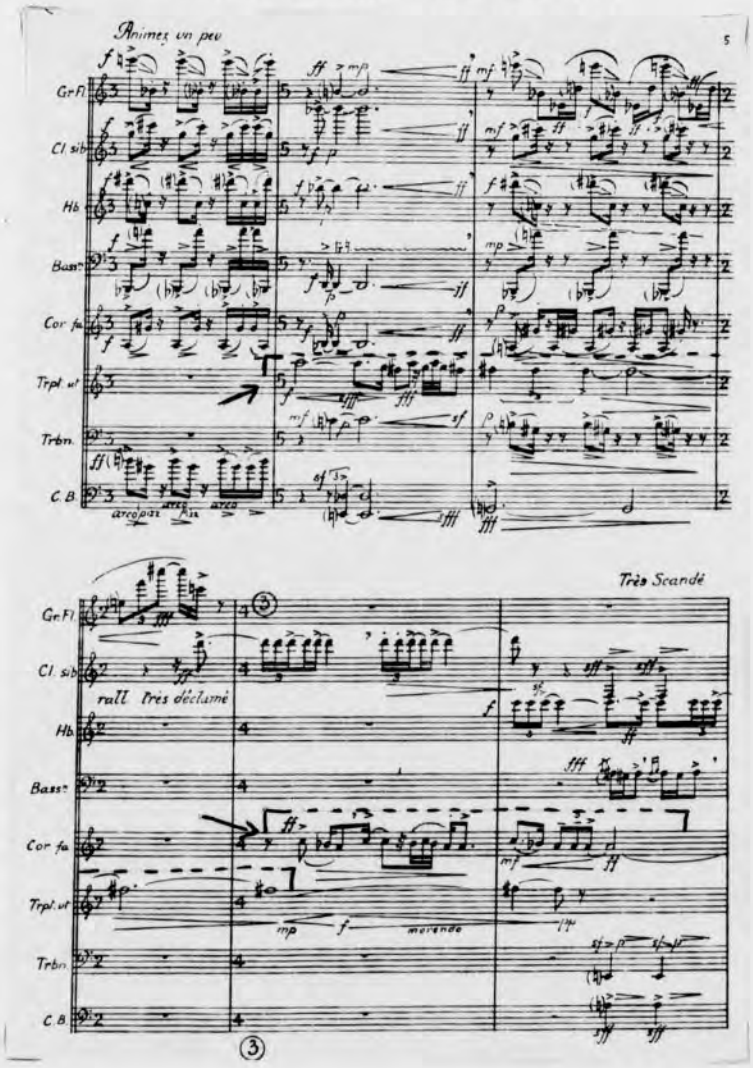
Measures 19-21. Abrupt shifts in texture, rhythm, and register indicate the beginning of a new section. The sound groups of C-sharp, C; paired vertically with F-sharp, G (both derived from group IV), are treated antiphonally with the paired masses of B, B-flat, A; and D, D-sharp, E (derived from group III).

Ex. 25. Octandre: Movement I, Meas. 19-21, Paired Groups Presented Antiphonally



Measures 22-32. The leading motif of Octandre returns at measure 23, and is again stated at measure 26. This pair of motives, A, G, F-sharp; and F, E-flat, D, is reminiscent of the paired statements of the nucleus in the opening four bars. In the opening, the two groups of pitches are joined by the semitone. In the example below, the groups are joined by the minor ninth.

Ex. 26. Octandre: Movement I, Meas. 22-27, Adjacent Statements of the Leading Motif

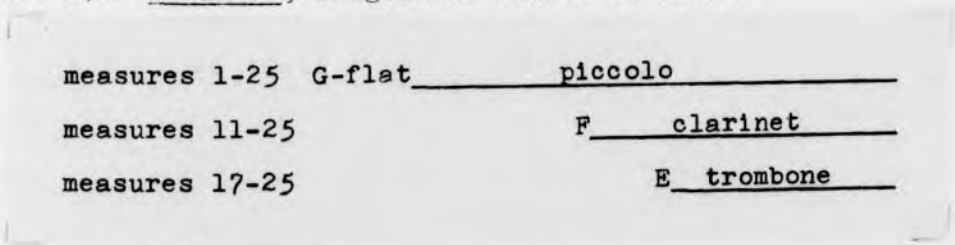


The original nucleus (group I) returns, transposed, in bars 30-32 on the pitches C, B, B-flat, A. The final bar, 33, is an incomplete statement, C, B, B-flat, which thus leads onward to movement II (attacca).[2] By using these notes, Varèse continues to avoid the initial pitch group (G-flat, F, E, D-sharp) which opened Octandre. He returns to the original version, with extended emphasis, in the opening measures of movement II.

Movement II

Measures 1-25. Movement II begins with a return to the first three pitches of the opening of movement I--G-flat, F, E (group III). Whereas in movement I the oboe played these pitches melodically, in movement II they are heard as planes of sound, and are divided among different instruments. Thus the piccolo emphasizes G-flat; the clarinet, F; and the trombone, E. A diagram of the pitch structure is shown below.

Ex. 27. Octandre, Diagram of Planes of Sound



[2]The complete statement of the nucleus originated in measure 25, with five bars of repeated C. This note, with other repeated pitches, forms a sound mass (measures 26-29) against which the leading motif is heard.

Measures 26-65. At measure 26, the group (G-flat, F, E) divides, or fragments, causing the formation of new pitch groups. Each of the preceding pitches becomes a focal point of a group related to this focus, or center; and each group may undergo further division and change as the movement unfolds. The following description of movement II, measures 26-65, explains how this process works, discussing the structural function of each pitch.

The Focal Point of E. The E, formerly heard in the trombone, is continued by the horn, which begins its expanding plane on this note.[3] The E dips a minor third below, to C-sharp, then back to E in measures 26-31.

Subsequently, in measure 35, the trombone again takes the E, adding D and E-flat. At measures 39-44 the expanding plane is stated in its entirety with the pitch order of C-sharp, D, E-flat, E. It is thus seen to be a transposed version of the original nucleus (group I), stated in retrograde.

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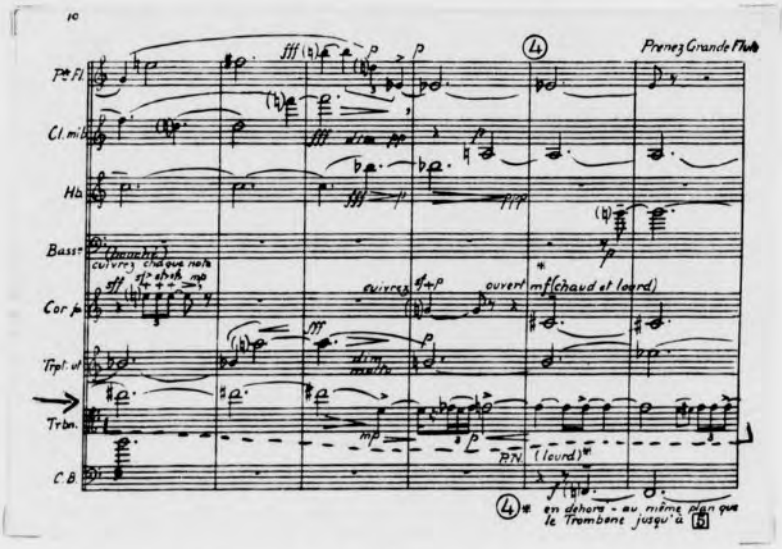
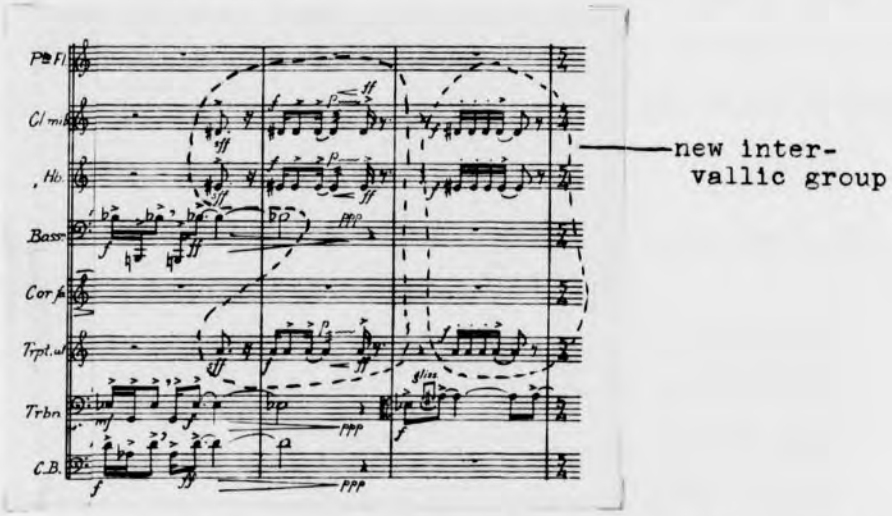
[3]Varèse often uses the same tone, repeated in different octaves, as the connecting link between changes of timbre.

Ex. 28. Octandre: Movement II, Meas. 39-44, Transposed Nucleus in Retrograde



The Focal Point of F-sharp (G-flat). The G-flat, formerly heard in the piccolo, is continued by the clarinet on F-sharp. The entrance of the trumpet on A at measure 25 forms a minor third with the F-sharp. Together with the oboe, on F-natural, a new group is formed (F, F-sharp, A). This is a sound mass in the middle register; it is heard four times--at measures 25-26; 31; 33-34; and 35.

Ex. 29. Octandre: Movement II, Meas. 33-35, Repeated Sound Mass



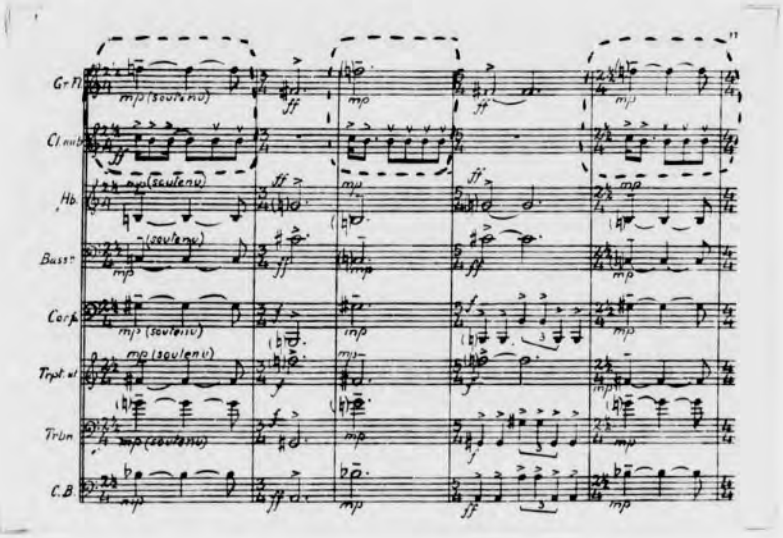
At measure 36, the preceding group is transposed to the pitches of G, A-flat, B;[4] it undergoes further transformation in the following measures. F-sharp is dissolved from its function as the focal pitch.

The Focal Point of F. The structural use of F as a focus has its origins in measure 43. It is emphasized by the double bass which later (measure 46) adds D, a major sixth above the F. This interval is an inversion of the minor third which has been prominent in the preceding groups centered around E and F-sharp. The relationship is clarified, when in measure 51 the flute continues the tone of F begun by the double bass, and the clarinet plays E-flat

[4]The transposition is a further instance of two similar groups adjacent to one another forming a pair.

and D below, constituting group II of the nucleus. This group is repeated eight times, in measures 51-65. The minor third, clearly stated in this tutti passage, is the leading motif of Octandre. (This motif was heard originally in movement I, measures 5-6.)

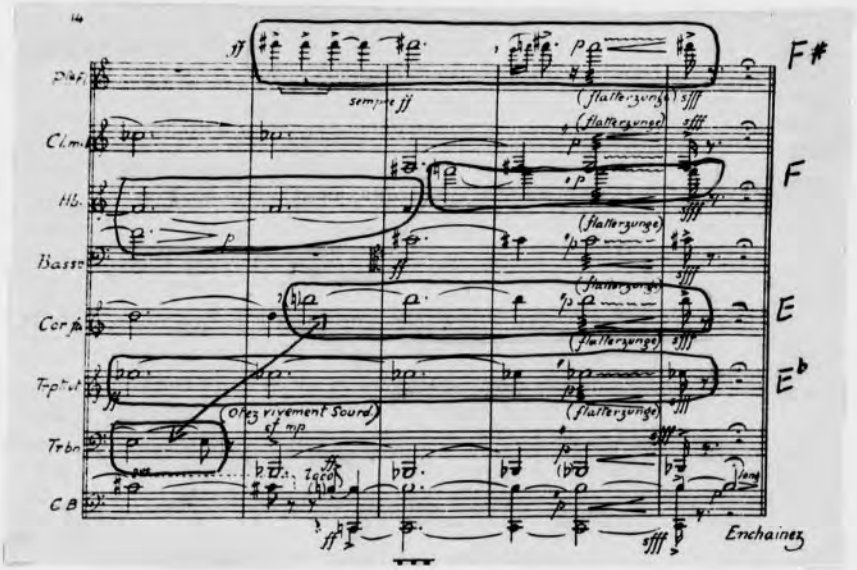
Ex. 30. Octandre: Movement II, Meas. 51-55, Variation of the Leading Motif



Measures 65-81. The nucleus (F-sharp, F, E), which had been dispersed into separated groupings, each with its own focal point, begins to coalesce once again. One by one, the pitches enter, and fluctuate slightly before settling down in the final tutti sound mass (measure 78). The E and F are the first to reach a state of stability (measure 75); next the E-flat (measure 77); finally the piccolo sounds the F-sharp in measure 78, and the nucleus is again a unit. Two other groups complete

the mass--B-flat, B-natural, C (group III); and A, G-sharp (group IV).

Ex. 31. Octandre: Movement II, Meas. 77-81, Original Pitches Coalesce to Form Mass



Movement III

Section 1

Measures 1-8. There is no decisive break between movements II and III. The ending of II is marked enchainez and the double bass continues its same pitch into the first measures of movement III. For this reason, measures 1-8 may be considered a transition which leads to the main body of movement III, an extended fugato.

The Fugato, Measures 9-45. Varèse has treated fugal procedure very freely. Several differences exist

between a conventional fugue and Varèse's fugal style, and should be noted at the outset. These differences are the reason for choosing the term fugato rather than the term fugue to describe the structure.

1. Varèse's fugato is not consistently contrapuntal--for example, see measures 24-39.

2. The "exposition" extends the length of the fugato, measures 9-45, because it is not until this point that all eight voices have presented their versions of the subject.[5]

3. Entrances, although related to the subject, are widely varied. These varied entrances are discussed later in this chapter.

4. There are no episodes.

Previously it was stated that the fugal subject in Octandre is a transmutation of the initial material. The following analysis shows that while the original nucleus is present in basic intervallic relationships, it is transmuted into an increasingly complex idea. The partial chromaticism of the opening becomes total chromaticism in movement III; contrapuntal lines are now much more intricate; and the short four-note motif of the beginning is transmuted into a lengthy fugal subject.

---

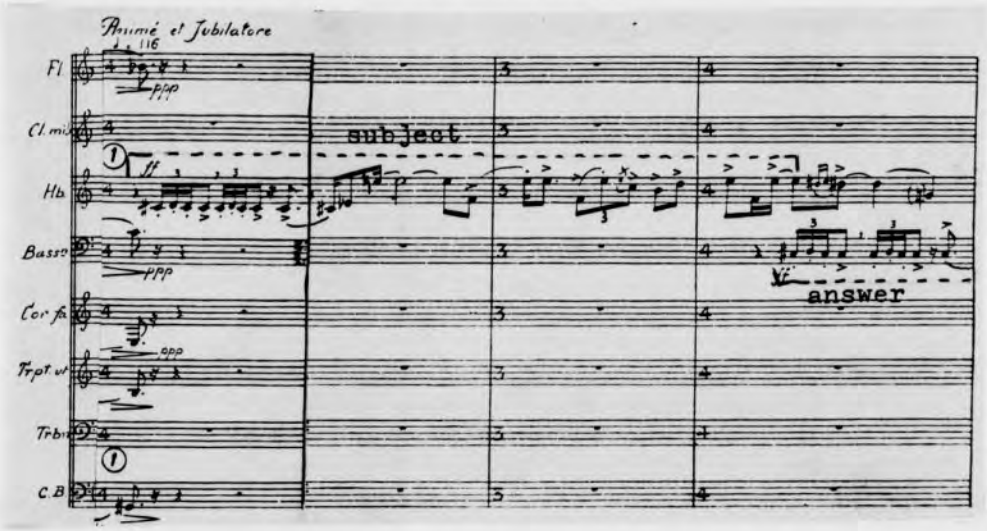
[5]In the traditional fugue, the exposition consists of only the first several bars, all voices having entered during this time.

The structure of the fugato is outlined below as follows:

1. The oboe enters with the subject and continues with a countersubject (measures 9-14). The subject is constructed upon the semitone and minor third intervals, derived from the nucleus.

2. The bassoon enters with a real answer, a perfect fourth below (measures 12-15). The oboe continues with a countersubject.

Ex. 32. Octandre: Movement III, Meas. 9-12, Subject and First Measure of Answer



3. The clarinet then enters with the subject, but varies the intervals during the course of the entry (measures 15-18).

4. The double bass enters with a variation of the countersubject (measures 18-20). The first measure of the

original countersubject is omitted, but the double bass entry closely parallels intervals and rhythms of the continuation of the original countersubject.

5. The horn enters with an inversion and augmentation of the subject which shifts back into the original version of the subject (measures 21-24). The shift occurs in measure 23.

6. The trumpet enters with a fragment of the subject, the minor third. It is stated in retrograde, and in this version the subject is recognizable as the leading motif of Octandre which is heard intermittently in all three movements. The trumpet enters at measure 24 and continues to reiterate the motif through measure 40.

7. The horn and flute share an entry, the horn sounding a motif derived from the subject, and the flute continuing the entry, in an extremely free variation (measures 42-44).

8. The trombone enters with a fragmented version of the subject (measures 44-45).

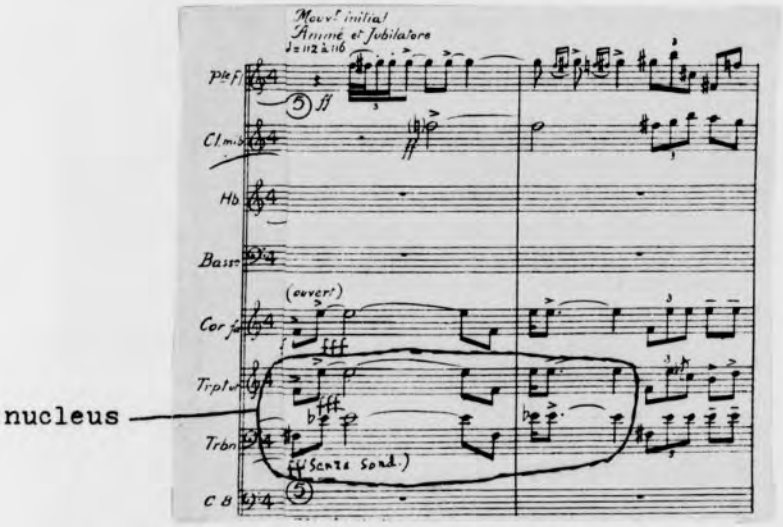
Except for two measures (40-41) there are no episodes. The subject, or variations on it, is continuous throughout the fugato.

Closing Section

Measures 46-60. The final section returns to the pitches of the original nucleus: F-sharp, F, E, E-flat.

This time, however, the nucleus is enriched by the addition of two pitches, B-flat and A, which are joined to the nucleus through rhythmic similarity.

Ex. 33. Octandre: Movement III, Meas. 46-47, Nucleus Returns, Enriched by Additional Pitches



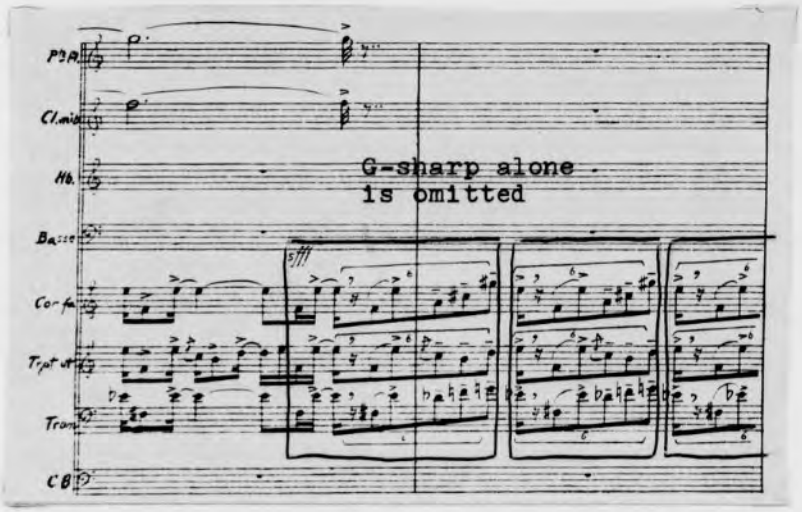
The emphasized pitches of the piccolo and clarinet in measure 46, G and A-flat, together with those of the horn, B-flat and A, constitute the adjacent four chromatic steps up the scale. Thus measure 46 consists of eight chromatic and adjacent pitches: F-sharp, F, E, E-flat; and G, A-flat, A, B-flat.

The chromaticism becomes complete in measure 47 when the piccolo and flute add the remaining four pitches: D, C-sharp, C and B.

The above two measure segment is repeated, with slight variations, five times.[6]

Chromaticism becomes more compact (although not complete) in measure 56, where the pitches are presented in a rhythmically unified group, persistently repeated.

Ex. 34. Octandre: Movement III, Meas. 56-57, Compact Chromatic Segments



The G-sharp, the only omitted pitch in the above groupings, appears subsequently at the final cadence of Octandre, measures 58-60. Registers expand upward and downward, and the 12 pitches are dispersed over a wide range as movement III closes.

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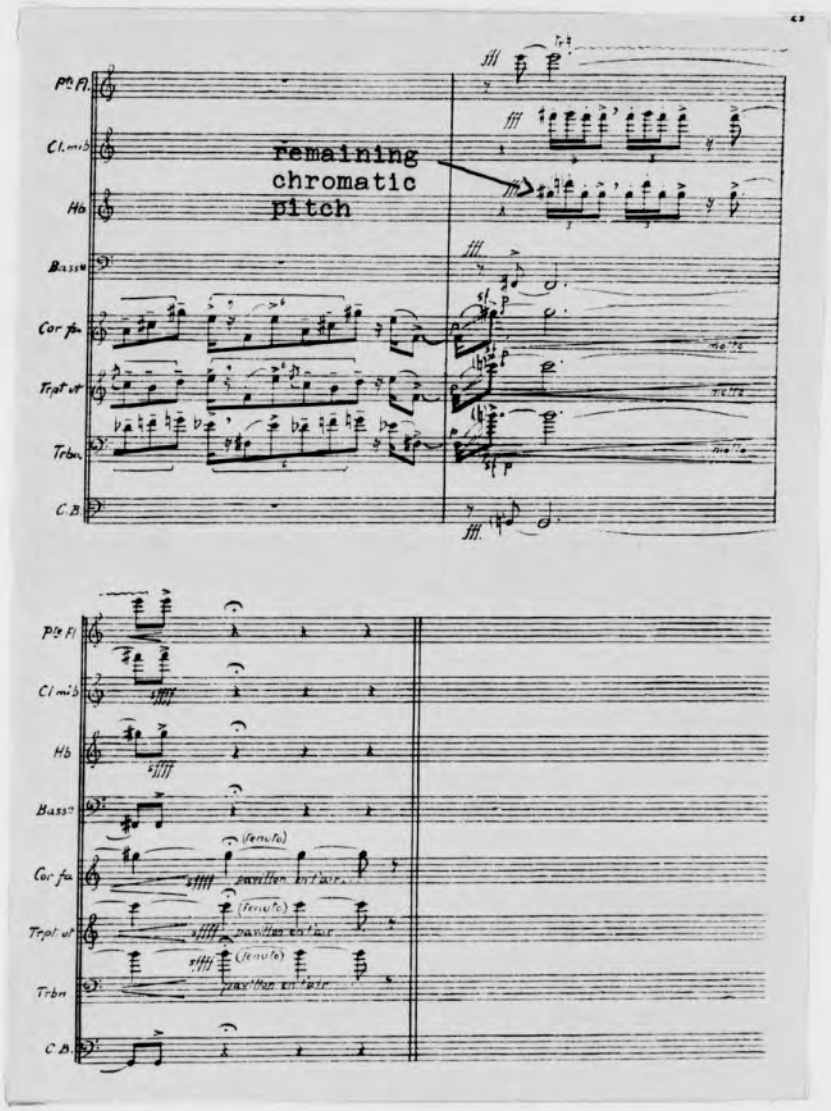
[6] A variation on the fugal subject is stated by the trumpet throughout the section.

Ex. 35. Octandre: Movement III, Meas. 58-60, Final Cadence Showing Widely Dispersed Pitches



Varèse's use of the 12 pitches in the concluding section of Octandre suggests that the work had, from the

opening, been moving toward the direction of total chromaticism. Thus, the nucleus, a group of four chromatic pitches initiated the process. The nucleus was later transposed, producing the adjacent set of four chromatic pitches. The body of the work consisted of various combinations and fragmentations derived from the nucleus. The ending completed the process by including the complete chromatic spectrum.

CHAPTER VI

ANALYSIS OF IONIZATION

Three Basic Sound Groups

Ionization is based upon three distinct groups of sound: two sound masses, and the nucleus. In order to distinguish between the sound masses, this paper will refer to them as sound mass I, and sound mass II. The groups differ from one another in timbre, texture and rhythmic characteristics. Although each undergoes transformations throughout the course of the work, each group also retains certain essential features by which it is recognizable.

Varèse, in his writing, speaks of such groups of sounds in his electronic music as "zones of intensities"[1] which do not blend, but are heard as isolated and distinct identities. He compares these "zones" to colors on a map which delineate separate regions.[2] In a similar fashion, he feels that timbre and dynamic differences define distinct regions of sound in his music. Ionization, a work for percussion instruments, also seems to be built on the idea of non-blending sounds because of its three distinct and autonomous sound groups.

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[1]Varèse, "New Instruments and New Music," p. 197.

[2]Ibid.

[3]Ibid.

The three groups are discussed in the paragraphs that follow in order of their appearance.

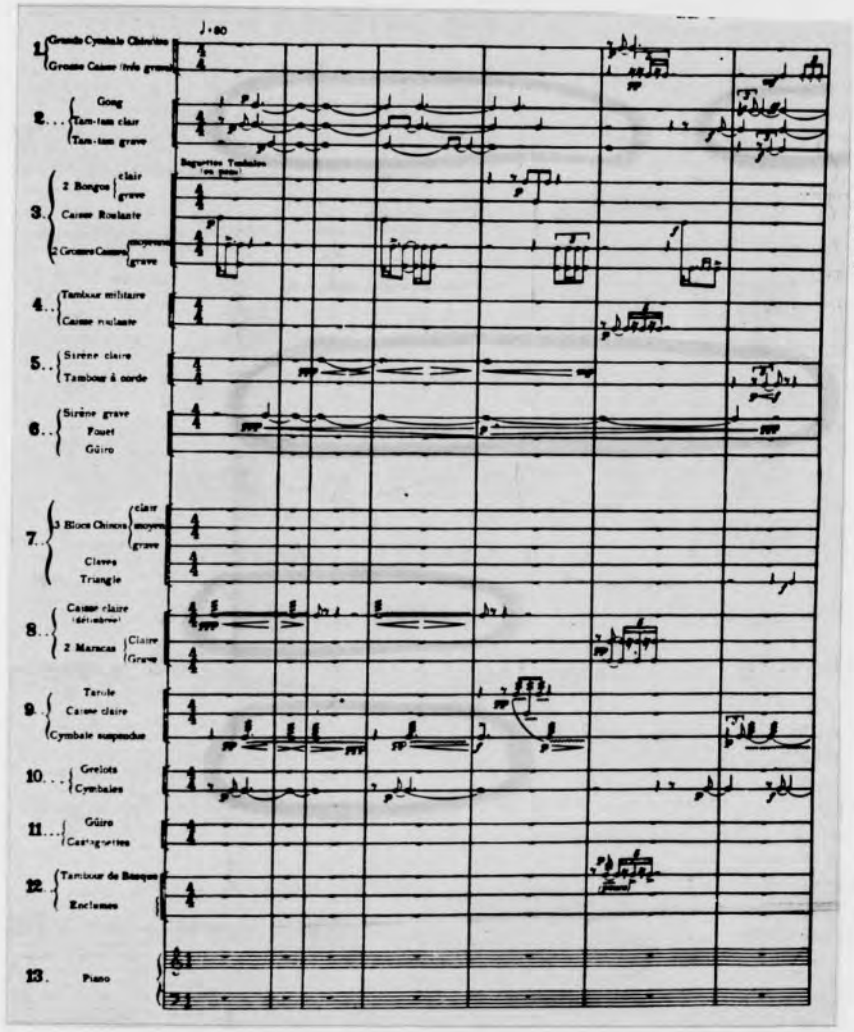
Sound Mass I

Of the three groups, sound mass I moves at the slowest speed. The note values are primarily whole and half notes, which are often further lengthened by ties. The texture is rich and full because of the large number of instruments which compose it. Varèse has used the gong, two tam-tams, two sirens, a drum roll, and two cymbals in constructing sound mass I. From the instrumentation, it is evident that the effect is one of resonance and reverberation.

This group also undergoes the least amount of textural change. The polyphonic texture, which characterizes the opening measures, remains constant until the ending (measures 75-91). In these final measures, the mass becomes homophonic. It also acquires a slow sense of pulse, not present previously.

Sound mass I opens the work (measures 1-8); returns at measures 13-17; becomes smaller and contracted in measures 28-32; and reappears at measure 51, where it continues in its complete and full version through the final measure, 91.

Ex. 36. Ionization, Meas. 1-7, Sound Mass I, Characterized by Sustained Notes



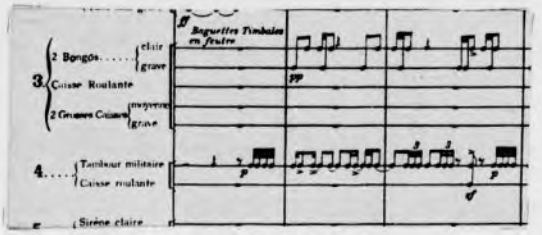
mass I: circled material

The Nucleus

The nucleus in Ionization is the core from which the work evolves. It consists of a pair of differing drum

rhythms, heard simultaneously, and first appears at measures 8-10.

Ex. 37. Ionization, Meas. 8-10, The Duo-Nucleus



Of the three groups, this is the most dynamic. It moves at a faster speed than sound mass I, as is evident by the shorter note values. The nucleus is extremely agile, and assumes a variety of shapes during the course of the composition. These different shapes define the structural outline of Ionization which will be discussed later in this chapter. Because of its role in defining the structural outline of the work, this pair of rhythms is the active ingredient, or nucleus, from which Ionization evolves.

Instruments which produce short durations of sound compose the nucleus. The bongo and tambour militaire reappear frequently as a pair, and other instruments which Varèse subsequently adds to this group have similar characteristics of fast attack and decay. Thus, when the nucleus expands to include the tarole, Chinese blocks and maracas, it remains a homogeneous group, and is clearly distinguished from the sustained and resonant nature of sound mass I.

While short durations of sound characterize the nucleus as a whole, other elements operating within it produce diversity. The first is relative pitch differentiation; the second is rhythm. These differences suggest that the nucleus in Ionization is actually composed of two separate ideas, presented simultaneously.

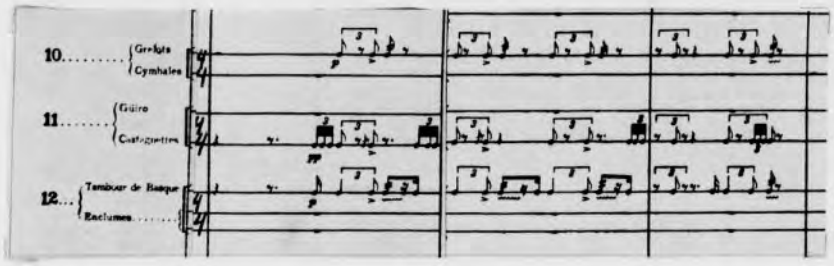
The bongo rhythm is characterized by relative pitch differences of high and low. It is short--three variations of this rhythm occur within a single presentation of its more lengthy counterpart, as is seen in example 37. The sense of meter is negligible.

The rhythm of the tambour militaire contrasts sharply with that of the bongo. The former has no differentiation of pitch levels, and it is composed of several motifs which combine to form a longer rhythmic phrase with a definite beginning, middle, and end. Varied only slightly, the rhythm of the tambour militaire maintains its identity and sense of direction during the first four entries. A regularly recurring pulse, further reinforced by syncopations, is clearly felt in this rhythm.

Sound Mass II

The third group of sounds on which Ionization is constructed is a blend of three timbres: sleigh bells, castanets, and tambourine. This sound first occurs at measures 18-20.

Ex. 38. Ionization, Meas. 18-20, Sound Mass II



In contrast to sound mass I, this group is both homophonic and rhythmically articulated. The notes are not sustained and are distinctly separated by rests. Notes first are grouped into threes, and subsequently into fives. The rhythm moves more quickly than that of sound mass I, since the note values of this group are primarily eighth and sixteenth notes.

Sound mass II is subject to more transformations than the first mass. It grows larger in size by the addition of the guiro (measure 31), and the anvils (measure 51). It also shifts in its makeup, by presenting different combinations of the timbres which compose it. Ultimately, it is dissolved and replaced by a larger mass composed of bells, glockenspiel à clavier, tam-tam, and piano (measures 75-91).

Large-Scale Structural Plan

Ionization is a one-movement work with no specific indications of internal divisions. Tempo, in particular,

unites Ionization. Varèse has written a single tempo marking, placed at the beginning, and has not indicated deviations from it. He has written no ritardandos, no accelerandos, nor marks of any kind affecting the tempo. The one exception to this consistency of tempo is a fermata, occurring at measure 65.[4]

However, within the one movement framework, there are breaks or divisions in the continuity of texture, timbre, and rhythm. These divisions define five sections, each of which presents a different manifestation of the nucleus. These manifestations of the nucleus are the basis for the external structure of Ionization. Each section becomes more intense, moving progressively toward a climax which occurs in the fourth section. In the final section, the nucleus dissolves, disintegrates, and becomes part of an entirely new group of pitched instruments. This ultimate and substantial change is the transmutation in Ionization.

The different sectional manifestations are outlined below.

Measures 1-22. Varèse presents the nucleus followed by three varied repetitions.

Measures 23-37. The nucleus is fragmented, resulting in the formation of new rhythmic motifs related to the original nucleus, yet different from it. These new motifs

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[4]It is, nonetheless, interesting to note the absence of a regular beat, or of rhythmic regularity which exists within the general unity of tempo.

are dispersed vertically throughout a complex contrapuntal texture. One of these emerges as more important than the others, and becomes the leading motif.

Measures 38-50. The rhythmic pattern of the leading motif is expanded. The texture is homophonic, and the resulting musical shape is that of a succession of rhythmic variations. The homophonic texture is in contrast to the previous texture which was polyphonic, with rhythmic variations presented simultaneously.

Measures 51-65. Varèse returns to the original nucleus and elaborates upon it. The emphasis is on wholeness and completeness, since this time the nucleus does not split into diffuse and fragmentary motifs, as in section 2. This return is the climax of the work as indicated by especially rich texture and timbre, as well as by the loud dynamic level.

Measures 66-91. The further expansion of the nucleus leads to its ultimate disintegration, brought about by increasing fragmentation and distortion. In measures 75-91, the underlying rhythm of the leading motif is transmuted into a new body of sound, constructed of pitched instruments.

Each of the above sections is defined by the combined components of rhythm, texture, and timbre. However, rhythm is the element which is most essential to the structure of Ionization. A variation of the nucleus rhythm

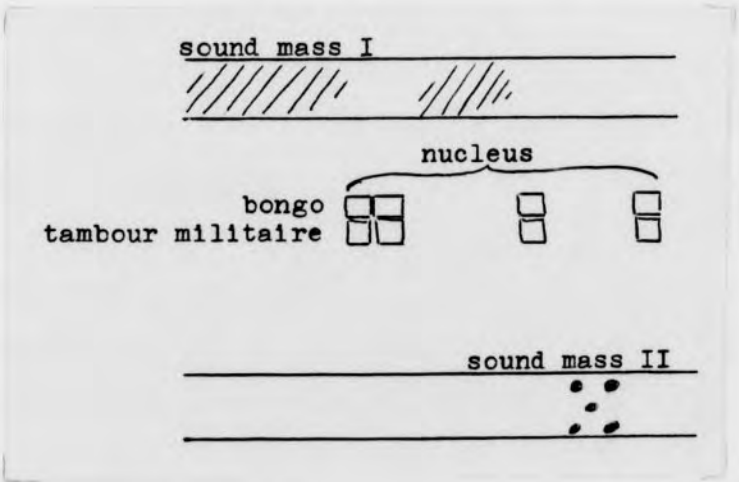
is present in each section. During the final transmutation, it is the rhythm alone which remains intact, amidst a completely new array of timbres, textures, registers, and pitches.

Detailed Analysis of Sections

Section 1

Measures 1-22. In this section, Varèse presents the three groups of sound on which Ionization is based: sound mass I, measures 1-8; the nucleus, measures 8-10; and sound mass II, measures 18-20. Each composite sound is heard separately, and for this reason, each is distinctly understood at the outset. The presentation of sounds may be diagramed in the following way:

Ex. 39. Ionization, Diagram Showing Sound Groups Presented Separately.



Activity, in the sense of movement or change in direction, is at a minimum. The nucleus is heard four times with only slight variation. Timbres remain the same; dynamics change very little; and the texture of each group is presented and repeated rather than being developed.

Rhythmically, section 1 seems purposefully unsettled as to its direction. Throughout, it is without a strong point of arrival. Several factors contribute to this instability. The first sound mass, because of its instrumentation--siren, tam-tams, gong, etc.--together with the fact that its notes are sustained over bar lines, is inherently non-metrical. Sound mass II, an irregular rhythmic pattern, also is non-metrical. While it is true that the rhythm of the tambour militaire does project a sense of pulse, this pulse is partially obscured by the counter-rhythm of the bongo. The bongo, in its varying patterns, consistently avoids any sense of regular pulse, meter, or downbeat. Absence of a downbeat, or strong point of arrival in section 1 becomes especially significant in retrospect; the downbeat is delayed until section 2.

Thus in section 1 the basic sound groups have become familiar, very little directed action has taken place, and the stage is set for the arrival of dynamic activity which characterizes the main body of Ionization.

Section 22

Measures 23-37. What might be described as a musical explosion occurs on the first beat of measure 23. The first strongly accented downbeat arrives, and is repeated in measures 24, 25, and 26. Consequently, measure 23 is the first definite point of arrival in the work. In retrospect, section 1 is interpreted as leading to this point.[5]

Coincidental with the arrival of the downbeat is the proliferation of rhythmic patterns. It is as if the force of the downbeat had split and shattered the nucleus, causing its rhythmic components to multiply and establish six related but independent rhythmic patterns. Abruptly, the texture becomes a highly complex polyrhythmic web of motifs. The six rhythmic patterns, presented at times all simultaneously, are found more often in smaller combinations. One of the simultaneous presentations is shown below. A description of each differing rhythmic pattern follows this example.

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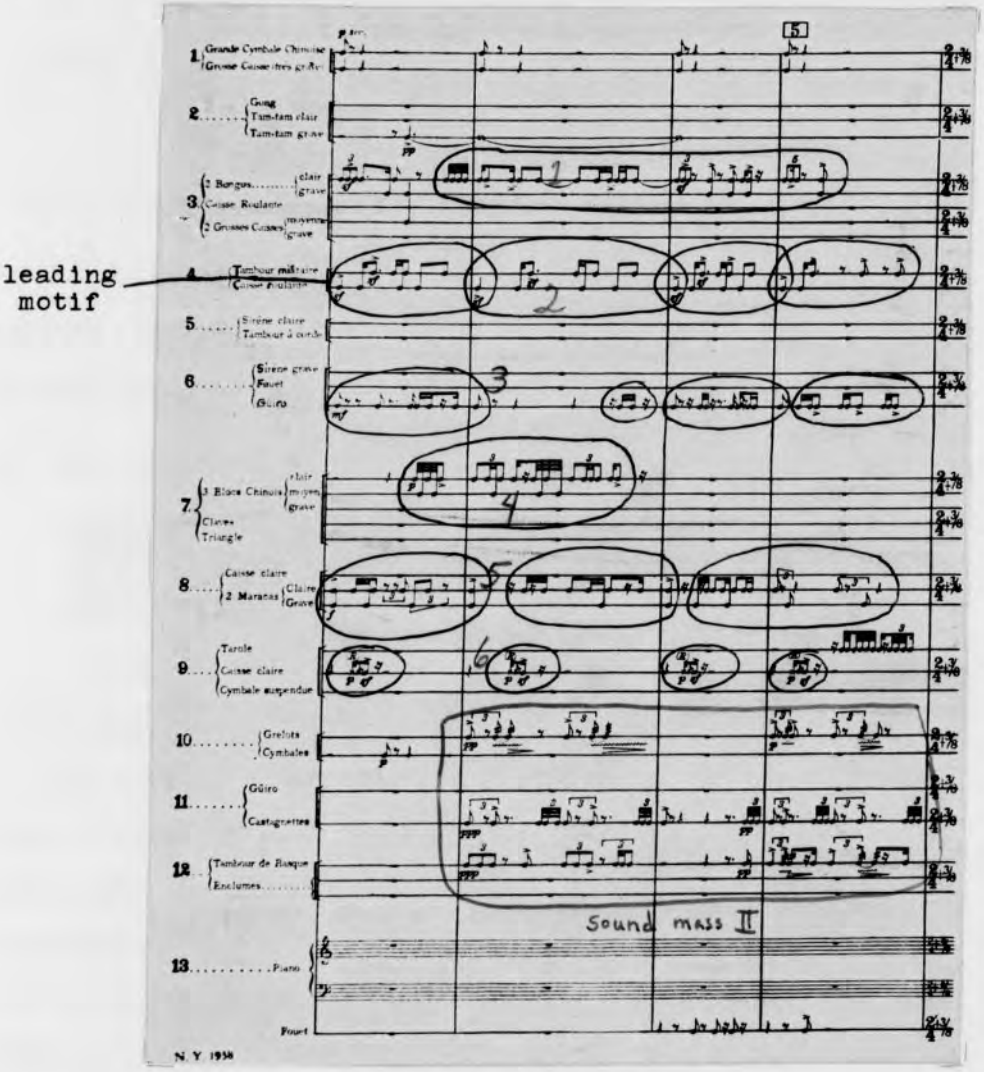
[5]The title, Ionization, is particularly significant in relation to measure 23. Scientists (at the American Museum of Atomic Energy in Oak Ridge, Tenn.) define ionization as "the process by which an electrically neutral atom loses or gains electrons and becomes charged." Varèse's music, Ionization, behaves in a similar manner. What was static and repetitious before measure 23 suddenly, at this point, becomes dynamic. It appears that the addition of the downbeat, and the presentation of the leading motif, are the active ingredients which set into motion the remainder of the composition.

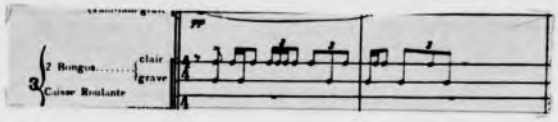
Ex. 40. Ionization, Meas. 23-26, Proliferation of Rhythmic Patterns



1. The bongos (see example 40) begin with an imitation of the tambour militaire's rhythm in the original nucleus. As they continue, the bongos expand certain fragments of this pattern which, in turn, compose new and

constantly varying rhythmic patterns. An illustration of one of these new patterns is given below.

Ex. 41. Ionization, Meas. 28-29, Rhythm of the Bongos



2. The most important new pattern to emerge becomes the leading motif of Ionization. From this point onward, Varèse uses it extensively.

Ex. 42. Ionization, Meas. 23-26, The Leading Motif

The leading motif is derived from the bongo rhythm of the nucleus.[6] While the bongo rhythm was fragmentary and its pattern changeable, the leading motif, in contrast, takes a definite and fixed shape, has a regular sense of pulse, and is stated consecutively four times. As the instrumentation in example 40 shows, the tambour militaire and the caisse roulante have now exchanged places with the bongo.

3. The guiro rhythmic pattern also varies. However, the variation is concentrated upon a central idea, that of two sixteenth notes followed by an eighth. The pattern is derived from a fragment of the original bongo rhythm.

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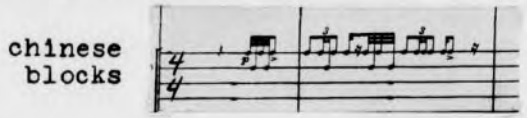
[6]See example 37.

Ex. 43. Ionization, Meas. 26-29, Rhythm of the Guiro

4. The Chinese blocks and claves play an ornamented variation of the tambour militaire's rhythm heard originally in the nucleus. The example below illustrates the rhythm of the Chinese blocks.

Ex. 44. Ionization, Meas. 23-24, Rhythm of the Chinese Blocks

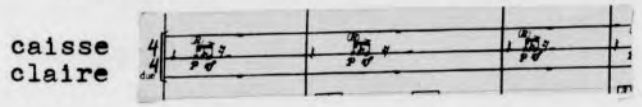


5. The maracas reinforce the leading motif, with a syncopated version of this motif heard simultaneously with the original (see example 40).

Ex. 45. Ionization, Meas. 23-26, Rhythm of the Maracas

6. The caisse claire plays a fragment derived from the leading motif. This fragment reinforces the leading motif on the second beat.

Ex. 46. Ionization, Meas. 23-25, Rhythm of the Caisse Claire



To the complexity of the above six rhythmic patterns, Varèse has added yet another grouping--that of sound mass II, occurring in measures 24-27, and again in measures 31-37. Both groups are variations, rather than repetitions of the original mass (measures 18-20).

In section 2, then, Varèse works with a wide diversity of rhythms derived by splitting the duo-nucleus into various motifs. The complex, polyrhythmic texture which results is unified by the prominence of the leading motif, heard continually throughout this section.

Section 3

Measures 38-50. The texture changes dramatically in measure 38. What had been previously a complex web of individual voices, becomes simplified, united, and homophonic. Even sound mass II, characteristically a non-blending, independent "zone of intensity,"[7] now joins the other instruments. The total effect of section 3 is thus one in which the separate voices unite, blend, and project a single idea.

The idea which they project is a variation of the leading motif. Other ideas--sound mass I, and the original nucleus--do not appear in this section. Attention is focussed entirely upon the leading motif.

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[7]See supra, p. 87.

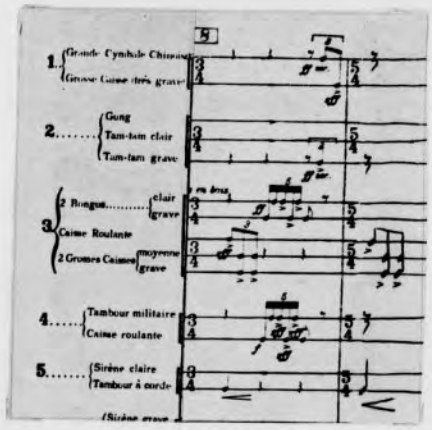
While the texture is simplified, the rhythm throughout section 3 becomes increasingly complex. Rhythmic complexity is evident both in the metrical shifts which occur throughout this section, and in the subdivisions of the original pattern. The leading motif is both shortened and lengthened in this process.

Timbre, also, plays an important role in varying the leading motif. The motif is now expanded throughout the orchestra, whereas originally it was confined to the tambour militaire and the caisse roulante.

The leading motif, it is recalled, is originally heard in 4/4 meter and is characterized primarily by two-note groupings (see example 40). The original motif consists of one full measure and the downbeat of the following measure. The downbeat is both the end of the motif and the beginning of the restatement. In section 3 the leading motif is now transformed in the following ways.

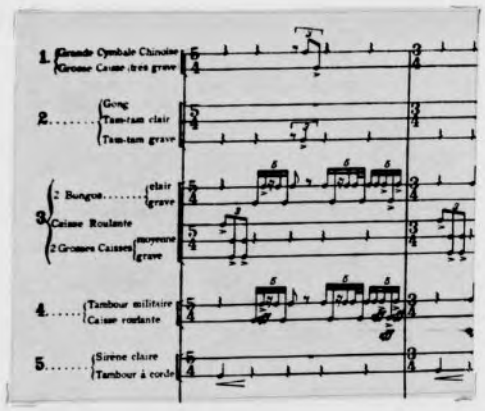
First, the note groupings are subdivided into groups of threes and groups of fives. The meter shifts to 3/4, thus shortening the length of the original motif.

Ex. 47. Ionization, Meas. 44, Variation of the Leading Motif



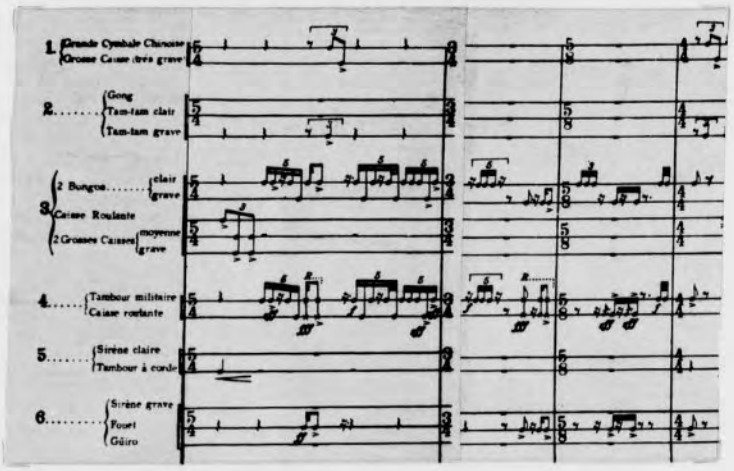
Second, the meter then shifts to 5/4, which results in prolonging the final beat of the motif. Through this use of additive meter, the leading motif expands horizontally. Corresponding vertical growth is seen in the expansion of timbre. The motif is now divided, hocket-fashion, among many instruments, as compared with the initial statement (see example 40) of two instruments only.

Ex. 48. Ionization, Meas. 45, Expansion of the Leading Motif



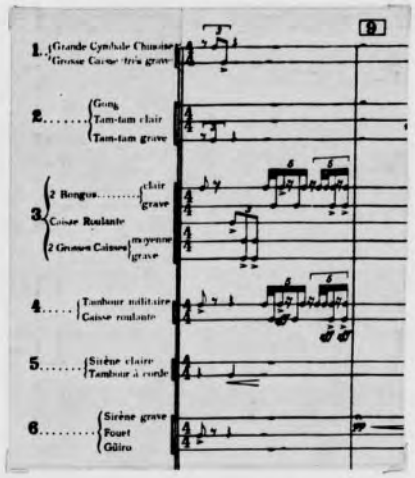
Third, the motif is lengthened still more in measures 47-49, when Varèse interpolates two full measures before arriving at the downbeat in measure 50.

Ex. 49. Ionization, Meas. 47-49, Further Expansion of the Leading Motif



The final statement (in section 3) is shorter, and returns to the 4/4 meter of the original motif. However, it retains the subdivisions of fives and threes, and the additional timbres which it acquired in this section.

Ex. 50. Ionization, Meas. 50, Return of Original Meter of the Leading Motif.

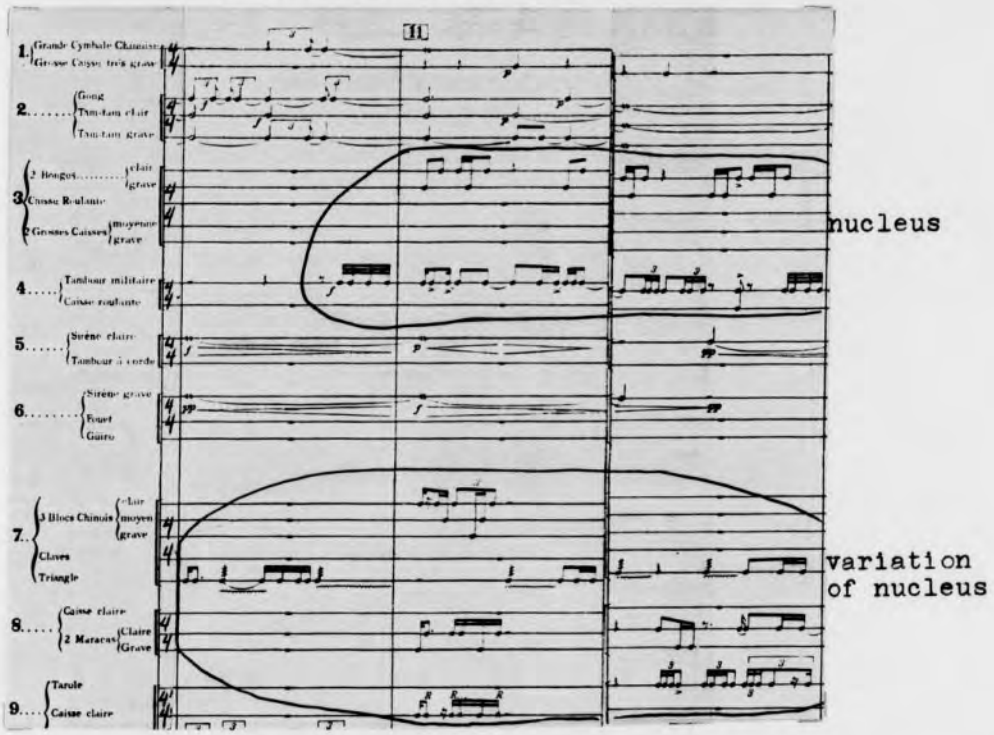


Section 4

Measures 51-65. In section 4, Varèse returns to each of the primary sound groups: sound mass I; the duo-nucleus; and sound mass II. The leading motif also is present. In this sense, section 4 is like a recapitulation.

Section 4 is also the climax of the work because of the expanded dimensions with which Varèse is working. The dynamic level of the nucleus is now forte to fortissimo. Previously (section 1) it was piano to mezzo forte. Instrumentation is expanded through the introduction of a new instrument, the anvils. In addition, the texture of the nucleus is enriched by the addition of maracas, caisse claire, and the tarole in measures 59-61.

Ex. 51. Ionization, Meas. 59-61, Nucleus Returns in Expanded Orchestral Setting



Thus the return is not a literal repetition of the first part, but rather an expanded and varied presentation of the original material with increased dynamics, instrumentation and textural complexity.

A striking contrast of timbre and texture marks the opening measure of section 4. Sound mass I returns (measure 51) and continues, with only brief interruptions, to the end of the work. Varèse also introduces the anvils in this first measure. They, too, recur throughout this section. The anvils later combine with timbres from sound

mass II. The new combination results in a more diverse mass, instrumentally, but one still identifiable through the recall of original timbres and rhythms (i.e., the rhythm of the anvils is closely related to the rhythms of sound mass II). Both masses provide a background against which the active rhythms of the nucleus and the leading motif appear.

The nucleus emerges gradually and is partially disguised at first (measures 56-58). The maracas play a suggestion of the bongo rhythm in measure 56. The bass drum further suggests this motif, but in a version varied by augmentation and triplet groupings. The tambour militaire also gives a hint of its original rhythm.

The suggestions are clarified in measures 59-61, when the bongo and tambour militaire return to a repetition of the original nucleus.[8] The section continues with an expansion of the nucleus. In the final two measures of section 4 the leading motif enters. It is heard in its entirety once; its repetition is of only the first half of this motif, abruptly broken, which leads on to section 5. A fragment of sound mass II also enters in the concluding bars of section 4.

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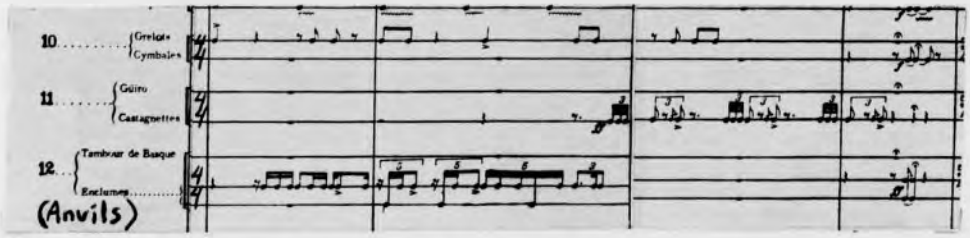
[8]See <u>supra</u>, example 51, p. 106.

Ex. 52. Ionization, Meas. 62-65, Fragment of Sound Mass II Returns, Adding Anvils



Varèse has thus restated each of the principal ingredients of Ionization in this section. The emphasis is on longer lines, sustained sounds, and completed or expanded statements of the original nucleus. What before had been split, divided, and proliferated, is in this section reunited, whole, and tied together.

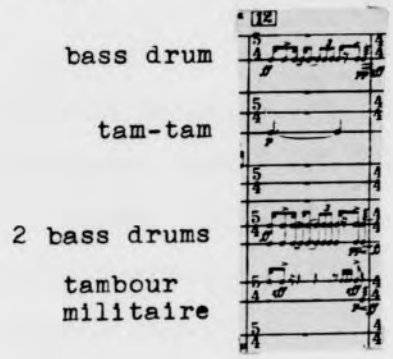
Section 5

Measures 66-91. The energy generated by the moving bodies of sound gradually winds down in the final section. Loss of rhythmic momentum, darker timbres, and an expansive wash of stationary pitches contribute to the feeling of stability with which Ionization closes. Both the nucleus and sound mass I undergo a transmutation in these final measures, 75-91. An entirely new group of pitched instruments appears, and timbre, texture and register are completely changed. All that remains is an underlying rhythm, present throughout the work.

From the beginning of section 5, each body of sound relaxes its tension in its own way. While it is their combined effect that produces the prevailing quality of stability, each will be described separately in the paragraphs which follow.

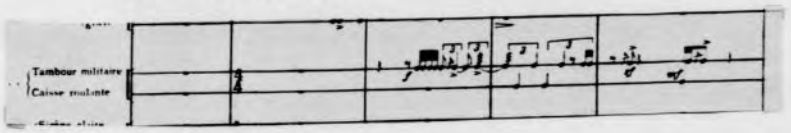
The Nucleus. The rhythm of the tambour militaire assumes a darker, more somber quality when played by three bass drums, motto-like, in measures 66, 68, 73, and 74.

Ex. 53. Ionization, Meas. 66, Bass Drums Take Nucleus Rhythm



This rhythm continues to lose force when, in measures 84-86, the sense of pulse is obliterated in the slower triplet groupings.

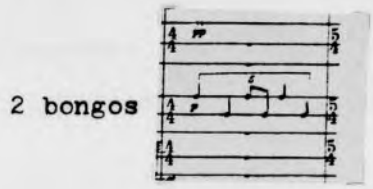
Ex. 54. Ionization, Meas. 82-86, Rhythm of the Nucleus Becomes Slower



Fragmentation and disintegration of this motif occur through the final bars, 87-91.

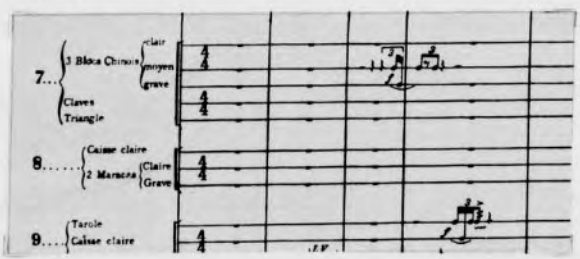
The bongo rhythm slackens its pace early in this section. At measure 67, it becomes only a suggestion of the original.

Ex. 55. Ionization, Meas. 67, Rhythm of the Bongo Becomes Slower



From this point, to the end, only infrequent fragments of the bongo rhythm are heard, transferred to different instruments. For example, in measures 77-78, the Chinese blocks sound a brief reminder. The caisse claire also echoes this rhythm.

Ex. 56. Ionization, Meas. 75-78, Fragments of the Bongo Rhythm



The Leading Motif. Of the three active rhythms, the leading motif maintains its strength over the longest

period of time. It is stated three times, in measures 69-72. It reappears at measure 79, where the strongest note of this motif--the downbeat--is abandoned. Lack of the downbeat immeasurably weakens the drive of this rhythm, and it too becomes fragmented, disintegrated, and finally silent.

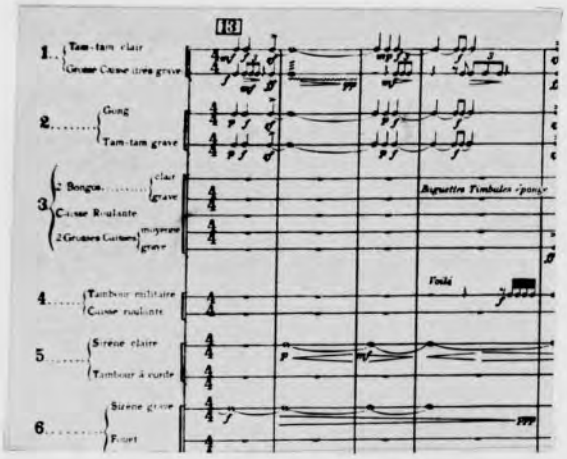
The silence of all three rhythms in the final measure is noteworthy. One by one, they have disintegrated and disappeared. Only the transmuted sound mass remains.

Sound Mass I. In comparison to the active rhythms, sound mass I has thus far undergone very little change. Remaining constant, it seems to provide, throughout its appearances in the first four sections, a backdrop of timbral color against which action in other parts occurs.

In section 5, measures 75-77, the texture of sound mass I begins to shift. It becomes increasingly homophonic when its voices become more rhythmically similar to one another.

Also, sound mass I acquires, for the first time, a slow sense of pulse in measure 75. The pulse becomes progressively slower until it is at last motionless.

Ex. 57. Ionization, Meas. 75-78, New Homophonic Texture of Sound Mass I

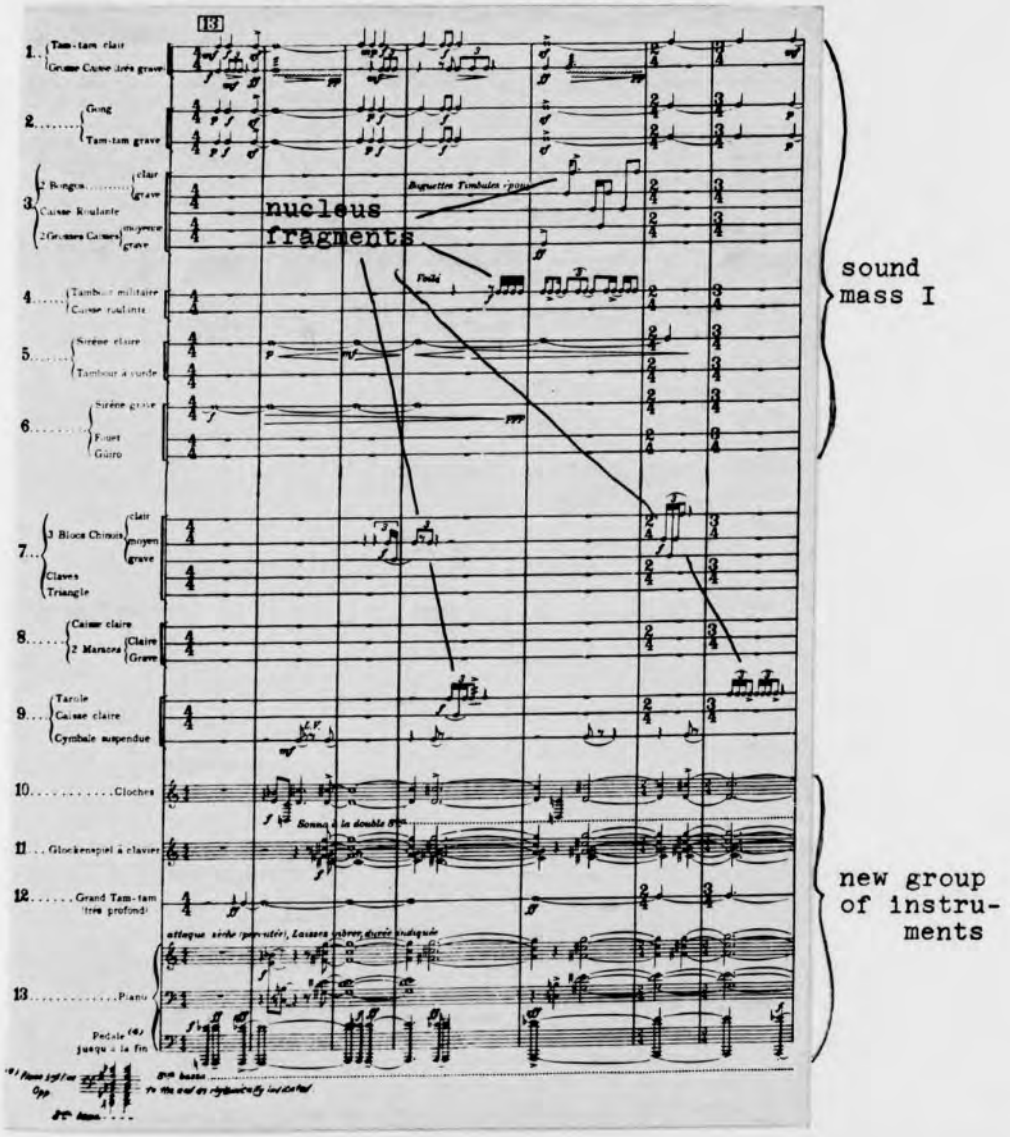


Sound Mass II. This sound group underwent its first structural transformation when the anvils were added in section 4. In section 5, various combinations of instruments cause further shifting of its makeup: castanets and tambourine, measures 66-67; castanets and anvils, measures 69-71; and a return to the original grouping of castanets, sleigh bells, and tambourine, measures 72-74. At this point, sound mass II ends. None of its timbres reappears.

The Transmutation. Sound mass II is replaced immediately (measure 75) by a much larger mass composed of an entirely new group of instruments: the piano, tam-tam, tuned bells and glockenspiel à clavier. Except for the tam-tam, these are instruments of definite pitch. Together they form a composite and stationary sound in which individual pitches are indistinct. The effect is somewhat that of an impressionistic blurring of color. Sound mass I becomes intertwined, rhythmically, with this large mass, thus forming an

expanded mass of vast proportions. Fragments of both the nucleus rhythms and the leading motif also are heard.[9]

Ex. 58. Ionization, Meas. 75-81, The Transmutation



[9]As the preceding analysis points out, the nucleus and the leading motif become increasingly fragmentary in the closing measures. The size of the large mass remains stationary.

The pulse of the transmuted mass becomes gradually slower, the dynamics softer, and the mass ultimately recedes with the markings of morendo and pianissimo.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Virgil Thomson has observed that Varèse's music "is resistant to analysis."[1] He sees this as a "mark of quality"[2] which has spared it from being categorized or systematized into readily accessible formulae.[3] My own analysis tends to substantiate Thomson's statement in that I have found no fixed system or method present in the three works.

What does emerge from the analysis--while not a system--is a body of evidence which leads to a more precise understanding of Varèse's music in the following areas:

1. The underlying formal procedures that Varèse follows, consistently, in constructing these particular works.

2. Characteristics of Varèse's music which indicate its relation to widespread developments in twentieth century science, music, painting and architecture.

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[1]Virgil Thomson, American Music since 1910. Twentieth-Century Composers ed. by Anna Kallin and Nicolas Nabokov, Vol. I (New York: Holt, Rinehart and Winston, 1970), p. 45.

[2]Ibid.

[3]Ibid.

While the procedure and the characteristics actually are interrelated topics, the findings regarding each will be summarized separately for the sake of clarity.

Structural Procedure

Analysis shows that a close correspondence exists between Varèse's analogy of crystal formation and the formation of his music.[4] Like crystal formation, each of Varèse's works discovers its own unique and geometrical shape. Also like crystal, the structure of each evolves from a single minute core, the nucleus.

The discovery of the process which Varèse follows in constructing Octandre, Integrals, and Ionization helps to clarify his statement, quoted in Chapter II, page 28, that in his music form is the result of a process. The process which Varèse follows in these works is summarized below.

Each composition has at its center a brief and compact musical idea which is the basis for the entire work. This nucleus may be primarily rhythmic, as is the case in Ionization; or it may consist of pitches and intervals, as in Octandre and Integrals. Also, as Ionization indicates, the nucleus may be a duo-nucleus, i.e., two separate ideas presented as a single group.

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[4]For Varèse's analogy, see supra, pp. 26-27.

The nucleus is then fragmented, and the fragments recombine into new groups of sound. Writers have called these groups, variously, "blocks"[5] or "cubes of sound,"[6] "cells,"[7] or even "sound ikons."[8] By whatever name, they are Varèse's trademark, and are what give the music its distinctive sound quality. Varèse characteristically works with these sound groups as opposed to single tones, or single lines.[9] Each group is an entity, a fusion of specific timbres, rhythms, pitches and intervals; each is distinct from the others in register, timbre, intervals, dynamics, and pitch content. These groups are the building material from which the works are constructed.

Varèse frequently arranges the composite sound groups into larger geometrical-like shapes or designs. Thus, the groups may form tiers or layers of sound; they may form pyramids; or they may confront one another as juxtaposed

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[5]Salzman speaks of "blocks of sound." See supra, p. 6.

[6]Rosenfeld speaks of "shining cubes." See supra, p. 10.

[7]Virgil Thomson writes that the music is structured by "tiny cells or motives which agglomerate like crystals." See Thomson, American Music since 1910, p. 47.

[8]Robert Erickson, "Varèse: 1924-1937: Sound Ikon," The Composer, 1969, pp. 144-149.

[9]The expanding plane, a horizontal, semi-melodic strand of sound, contrasts with the sound blocks, and is often used as a thread of continuity to bind the blocks together.

sound blocks. Such geometrical sound patterns may be likened to the geometrical shapes a mineral assumes as it solidifies into crystal formations.

Sections in the three works are most often defined by a single, distinct shape. The shape may emerge gradually, through a process of growth in which groups of sound are continually added on to one another. On the other hand, a shape may appear quickly, and be repeated continuously and variously throughout the section.

The progression of sections forms the completed structure. Thus structure, for Varèse, is episodic in the sense that each episode normally presents a different shape or arrangement of the sound groups. Each section is further unified by tempo, rhythmic characteristics, repeated timbres, etc. The sum of the sections forms a dramatic whole, one which builds to a point of culmination.

Structural Outline

From the analysis, it is possible to extract the following structural outline, common to Octandre, Ionization and Integrals.

In the opening part, Varèse presents the nucleus together with other sound groups out of which the work is constructed. Extensive repetition and varied repetition appear in this part.

A minute, but significant mutation triggers the latent energy of the nucleus, signaling the beginning of

the middle part.[10] The body of the work is characterized by many different episodes in which the nucleus is fragmented and used as the basis for abstract shapes and designs. The climax occurs near the end of this part.

In the concluding part the nucleus, or an element of the nucleus, returns in a recognizable but transmuted version. In Ionization the returning element is rhythm; in Integrals, solo texture; and in Octandre, specific intervals and pitches. Transmutation of the nucleus is both substantial and continuous throughout the final sections of the three works.[11]

Characteristic Traits

Analysis of Octandre, Ionization and Integrals brings to the fore specific characteristics of Varèse's style which are related to the structure of his music. Individually, these characteristics are not original with Varèse. One finds similar developments in contemporary science, painting and architecture, as well as in the music of other twentieth-century composers. Collectively, the characteristics point toward a new and original musical

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[10] A mutation might be a change in the initial intervallic groups, as in Integrals, measure 25. It might also be a change in rhythmic structure, as in Ionization, measure 23, where the downbeat is added. Octandre is an exception to the principle of mutation since it does not appear to have a specific point of change.

[11] In brief, the three divisions of the compositions therefore may be described as exposition; transformation; and transmutation.

language. They reveal Varèse as a composer who was aware of developments in diverse fields, and as one who incorporated new ideas from many sources into his work.

Many of the viewpoints discussed in the Introduction reappear in the following paragraphs. The value of the present analysis is that now these viewpoints can be related directly to the music. (Previously, it should be recalled, the viewpoints were expounded against a significant lack of specific analytical information.)

A discussion of stylistic characteristics fundamental to these works follows.

Cubism

Rosenfeld's description of Varèse's music as cubistic seems especially appropriate in light of the present analysis.[12] Cubes, or groups of composite sounds are indeed the primary building blocks out of which Octandre, Integrals and Ionization are constructed. The texture of the music is the result of composite sound groups, and their relation to one another.

A parallel may also be drawn between Varèse's use of the nucleus and Picasso's use of a particular figure. According to Picasso:

> There is no abstract art. You must always start with something. Afterward you can remove all traces of

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[12] See supra, pp. 6-7.

> reality. . . . Do you think it concerns me that a particular picture of mine represents two people? Though these two people once existed for me, they exist no longer. The "vision" of them gave me a preliminary emotion; then little by little their actual presences became blurred; they developed into a fiction and then disappeared altogether, or rather they were transformed into all kinds of problems. They are no longer two people, you see, but forms and colors; forms and colors that have taken on, meanwhile, the idea of two people and preserve the vibration of their life.[13]

For Varèse, in a comparable manner, the nucleus is an object to be varied, fragmented, and transformed. While the nucleus is always present, it most often exists in shapes, timbres and rhythms markedly different from that of the original presentation.

Also, the overall structure of Varèse's work is related to forms identified with Cubism. Form, in Varèse, is primarily a block-like series, or progression of many episodes. A section, unified by texture, rhythm, timbre, continues over a span of time and closes with a definite cadence. The succeeding section then contrasts markedly in texture, rhythm, and timbre.

Total Chromaticism

Perhaps the most surprising analytical discovery is Varèse's use of total chromaticism, evident in Integrals and Octandre. Both works reveal an organized plan for the

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[13]Pablo Picasso, "Statements," in Twentieth Century Culture: the Breaking Up, ed. by Robert Phelps (New York: G. Braziller, 1965), pp. 242-243.

use of the 12 pitches. In Integrals, the cadences which close sections regularly consist of all chromatic pitches except one. The remaining pitch appears as the first, as well as the most prominent pitch of the following section. Thus the twelfth pitch acts as an important connection, structurally, between sections. In Octandre, the nucleus itself is a collection of semitones. The work becomes increasingly chromatic, leading to the final measures where total chromaticism is emphasized through reiteration.

Such organized use of chromaticism indicates that Varèse worked within the same general pitch framework as that of the serialist composers of his day, Schoenberg, Berg and Webern. Through the study of Varèse's scores, one can well understand his admiration for Webern, in whose music he found "remarkable possibilities of expansion, new points of departure."[14]

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[14]Chou Wen-Chung, "Varèse: a Sketch," p. 156. Chou Wen-Chung does not elaborate on Varèse's statement, quoted above. However, analysis shows that in addition to total chromaticism, other points of contact exist between Varèse and Webern. Both composers work abstractly with small segments, i.e., groups of specific intervals, which are used as the basic material out of which the works are constructed. Webern derives his small and cohesive segments from his rows, particularly designed for this purpose. Varèse derives his segments from the nucleus, also designed to provide fundamental intervallic relationships. In both Integrals and Octandre, such intervallic groups are used as cubes of sound, and occur vertically as well as horizontally. Webern uses his row segments both melodically and harmonically, suggesting again a common origin for melodic and harmonic

Non-Ornamental Quality

In severity of outline, and corresponding lack of ornamental embroidery, Varèse's music reflects the period of history in which he wrote.

Donal Henahan, in writing on the contemporary lack of musical ornamentation, points out that instruments, "as if recognizing that the 20th Century is no time for frivolity . . . speak in plainer tones."[15] Henahan further discusses the present use of instruments as tools for "investigating the composer's formal schemes and emotional intents rather than as a performer's flaregun to illuminate musical surfaces."[16]

The description is well-suited to Varèse's music. Analysis shows a clarity of structure devoid of frills, flourishes and flamboyant excess. While Varèse does write solo parts, there are no passages intended for a display of virtuosity. All parts fit together precisely and balance one another, in a way that calls to mind Varèse's reference to the stone cutters who used no cement in their structures.[17]

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sonority. Both Varèse and Webern favor this abstract approach to their material, as opposed to Schoenberg's approach, in which the row is treated principally as a theme, or melody.

[15]Donal Henahan, "So You Want to Learn to Play the Violin," The New York Times, June 18, 1972, sec. 2, p. 24.

[16]Ibid.

[17]See supra, p. 7.

Perhaps it is more than a coincidence that Varèse rarely uses (in Integrals, Octandre, or Ionization) either keyboard or stringed instruments, well-known for their virtuosic possibilities. Instead, he concentrates on woodwind, brass, and percussion instruments.

Rhythmic Simultaneity

Varèse has said that in his works "rhythm derives from the simultaneous interplay of unrelated elements that intervene at calculated, but not regular time lapses."[18] In achieving this freedom from regular time lapses (associated with pulse and meter) Varèse employs many devices common to other composers. The musical examples quoted in the text show the following techniques to be among those employed: frequent use of ties over the bar line; numerous meter changes; use of instruments such as the gong and tam-tam which lend themselves to a free sense of rhythm; and many changes of tempo within short spans of time.

Where Varèse's work with rhythm seems most original is in its "simultaneous interplay of unrelated elements."[19] Both Integrals and Ionization are constructed on this principle.

In Integrals, the contrasting bodies of sound are (a) the high and low sound masses; (b) the expanding plane;

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[18] Varèse, "Rhythm, Form and Content," p. 202.

[19] Ibid.

and (c) the percussion group. Each is independent from the other through differing rhythms, in addition to differences in register and timbre. The three bodies of sound are often heard simultaneously, each maintaining its independence. Again, the three bodies may "collide" with one another, resulting in loss of rhythmic independence and the projection of a single, unified rhythm. In either case, there is an absence of steady beat, or pulse. Metrical feeling is lacking.

Ionization is based upon the same basic principle of rhythmic simultaneity and independence but on a more complex scale. This paper has already discussed the three contrasting sound elements on which the work is constructed.[20] The example which follows shows that not only does independence of rhythm exist among the basic sound groups; the inner construction of each individual group also may present its own set of differing rhythms. Again, a common metric feeling is absent, largely because of the number of diverse rhythms heard simultaneously. Cross accents also contribute to the metrical irregularity.

In the example below, the nucleus (marked in red) is composed of two differing rhythms: that of the tambour militaire; and the leading motif shared by the bongos, caisse roulante and the bass drum. The maracas play a variation of the leading motif.

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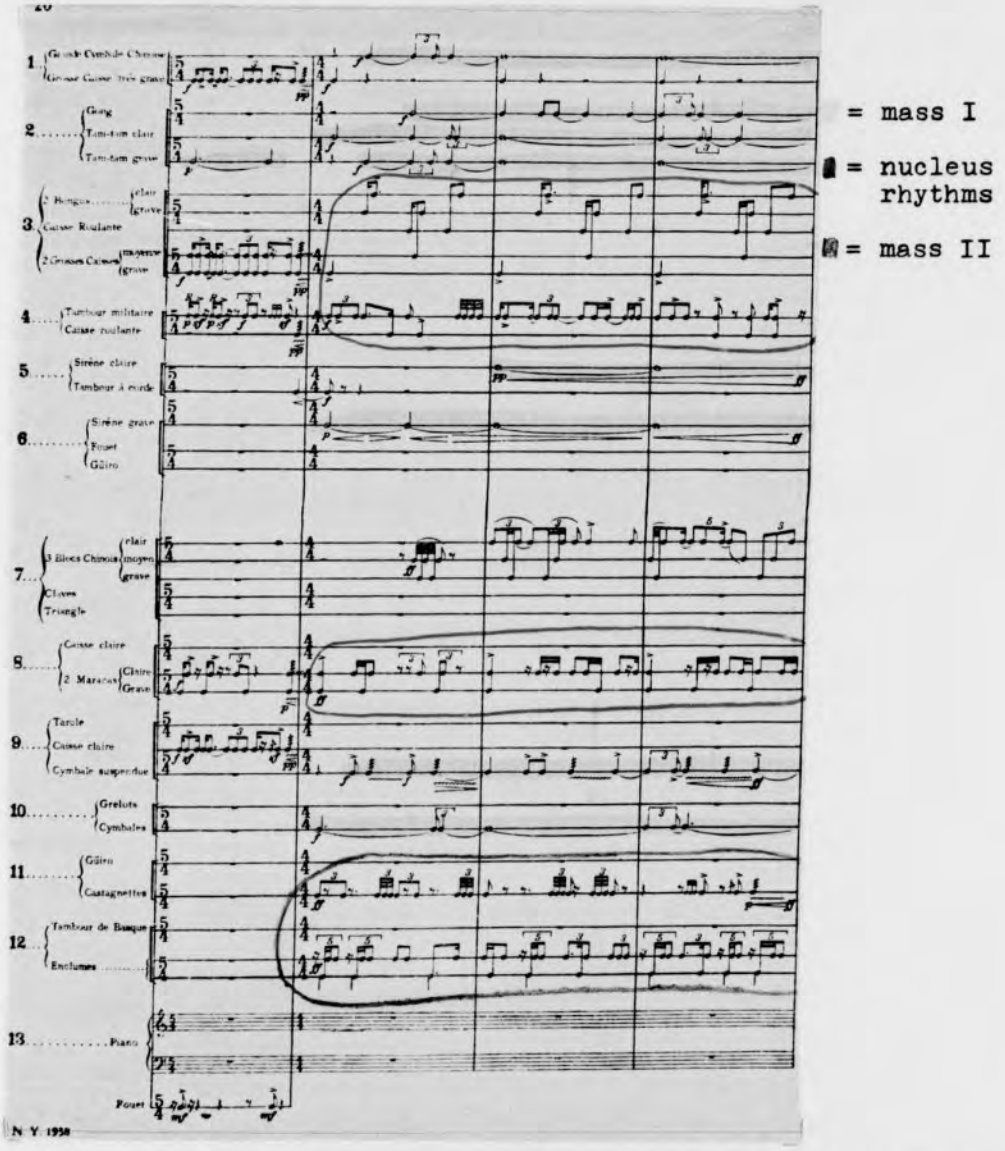
[20] See supra, p. 87.

Ex. 59. Ionization, Meas. 68-71, Rhythmic Independence Existing Within Each Sound Group



Sound mass I, the slow and sustained group (marked in yellow), consists of a number of separate entrances,

and shows variations of rhythm within the larger unity of the mass itself.

Sound mass II, although the most rhythmically homogeneous, still maintains a degree of rhythmic independence between its parts, played by the anvils and the castanets. (This group is marked in blue.)

Rhythmic simultaneity for Varèse, then, appears to entail two separate levels: first, the independence of the large cohesive bodies of sound, each of which moves at its own speed; and secondly, the more detailed level of rhythmic independence which may exist within each separate body.

Stratification: A New Texture

The preceding discussion on rhythmic simultaneity suggests that polyrhythmic texture is a primary attribute of Varèse's music. Moreover, the entire analysis indicates that the foundation of Varèse's composition rests upon independent bodies of sound, moving in relationship to one another.

Frequently, the bodies of sound move in parallel layers. Each layer is distinct from the others by wide distances between the registers. The layers are also distinguishable by differing dynamics, rhythms, timbres and interval content. For these reasons, the term stratification seems especially appropriate in describing this recurring texture in Varèse's music.

Contrapuntal texture, in the traditional meaning of the term counterpoint--that of melodic line against line--occurs only rarely. The one notable instance of contrapuntal texture is found in the opening of the fugue in Octandre. Usually, the texture is composed of composite blocks of sound. Varèse more often works with motifs, repeated notes, or sustained timbres than actual melodies. The stratified texture usually consists of differing groups, each often remaining on a single pitch level with variation among the levels achieved through dynamic, rhythmic and timbre differences.

Therefore, the analysis supports the view of Austin and those writers who find little evidence of traditional counterpoint in Varèse's music.[21] The texture is rather one of independent bodies of sound, moving in non-blending layers which, because of their distinct separation, produce an effect of stratification.

Two Scientific Principles: Ionization and Transmutation

The titles of Varèse's compositions suggest a relationship to science. Examples of such titles are Ionization, Hyperprism, Arcana and Density 21.5. Varèse's analogy between crystal formation and his musical structure is

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[21]See supra, pp. 17-18.

further evidence of a certain scientific influence on his thinking.

Analysis offers a more concrete explanation of the influence of science by pinpointing two specific processes operating in Varèse's music--those of ionization and transmutation. The process of ionization helps explain why Varèse gave Ionization its title.

Scientists define ionization as "the process by which an electrically neutral atom loses or gains electrons and becomes charged."[22] Varèse's composition seems, musically, to follow a comparable course. The nucleus of Ionization, during its initial presentations remains repetitious and static--like an atom which is neutral and not charged. Abruptly, and with no discernible musical preparation, the nucleus is transformed (measure 23). The instrumentation is changed, a downbeat is added and accented, and Ionization is launched on a course of dynamic activity. A chain reaction of increased activity follows, as dynamics, rhythms, and timbres combine to release the energy set in motion at the critical point of transformation.[23] The process of ionization, by analogy, therefore

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[22]This definition was obtained from the American Museum of Atomic Energy in Oak Ridge, Tenn.

[23]An essential point appears to be the suddenness of nucleus transformation. Unlike traditional music, the motivic nucleus in Varèse does not evolve gradually through a process of motivic development. Neither is it a

seems to be the force which brings about transformations of the rhythmic nucleus.

The transmutation of Ionization occurs in the final measures, 75-91. The nucleus disintegrates and dissolves into a large mass composed of an entirely new group of instruments. Timbre is changed, definite pitches are added, and the whole character is radically altered except for the ever-present underlying rhythm which is continued by the new group of instruments.

Analysis shows the same processes operating in Integrals. Here the nucleus--a group of specific intervals--remains repetitious and static until measures 25-26 where a new interval, the semitone, appears. The introduction of the semitone causes an immediate reaction throughout the score: a "collision," as Chou Wen-Chung has called it.[24] All intervals become semitones, and the music assumes the totally chromatic nature that is to be of such structural importance in its continuation. The transmutation in Integrals was analyzed by comparing the music of the opening measures to what it eventually becomes in measure 157.[25] All is radically changed, or transmuted, except for the solo texture of the expanding plane which is the basic element

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metamorphosis resulting from the continuing process of thematic transformation. Abruptly, without warning, a minute but highly significant mutation occurs, the nucleus is "charged" and the body of the work is set into motion.

[24] See supra, p.47.

[25] See supra, pp. 59-61.

common to both the original material and its transmutation. The initial material, static and repetitious, is transmuted into a free-flowing melody. Three such melodies subsequently become the structural basis of the concluding part.

In Octandre, the transmutation occurs in movement III, where intervals from the original nucleus become the subject of a fugato. The transmutation, in this case, thus involves the structure of the entire movement.

Therefore it appears that the scientific processes of ionization and transmutation, fused with a liberal amount of imagination, do provide a measure of insight into the structure of Varèse's music. Perhaps it is only natural that Varèse, because of his scientific turn of mind, and because he lived in the age of atomic exploration, sought new sources of energy and coherence in music. Tonality and meter, the older and traditional sources, have little or no place in such a world. New forces, related to new discoveries in science, art, music and acoustics, are all parts of a rich soil in which his fertile imagination took root.

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